A Haymarket publication

SETTING THE STANDARD

What MSX?

Autumn 1985

£1.50



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aha system to be won

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WORKING MSX — what to do with your micro

TOP 20 — our pick of the best games

All MSX computers are built to the same standard.

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At Pioneer we've never believed in following the crowd. We prefer them to be one step behind us.

And with our innovative reputation in Hi-Fi and In-Car Entertainment, people tend to demand rather special things from us. Our new PX-7 home computer is just that.

It has all the benefits you'd expect from a standard MSX home computer, but with a few added talents.

No other home computer enables you to create your own art and animation like the PX-7.

Up to 16 different colours are available and by using the optional PX-TB7 graphics tablet you can create illustrations, shapes and various backgrounds. Then store up to eight of these shapes with their respective animation programmes in the computer memory.

Moving Pictures. Use the PX-7 in conjunction with a video or LaserDisc* player to superimpose your graphics, creations or titles onto a moving video picture. The PX-7 can also produce stereo sound with three different voice patterns over eight octaves and superimpose them over other sound sources.

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So if you're looking for a home computer that's versatile, talented and one step ahead of the crowd, remember there's only one. The Pioneer PX-7.

Phone 01-200 0200 for your nearest PX-7 dealer.

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The LaserVision trader
certifies compatibility
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What MSX?

Autumn 1985 Volume 1 Number 3

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NEWS

COMPETITIONS

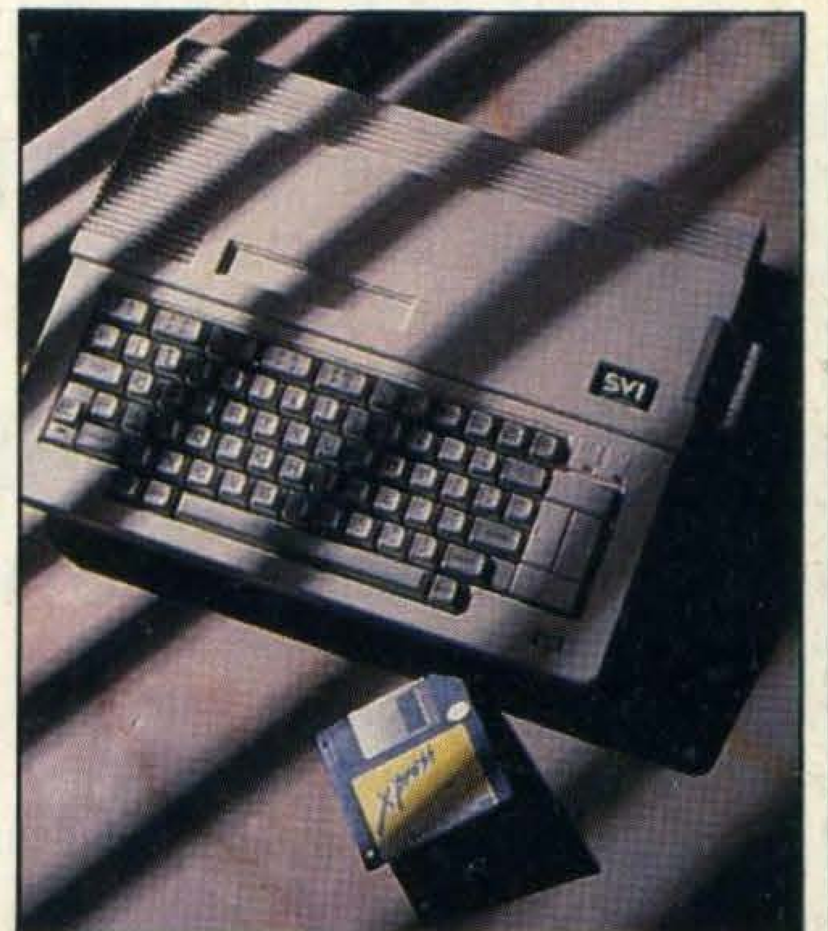
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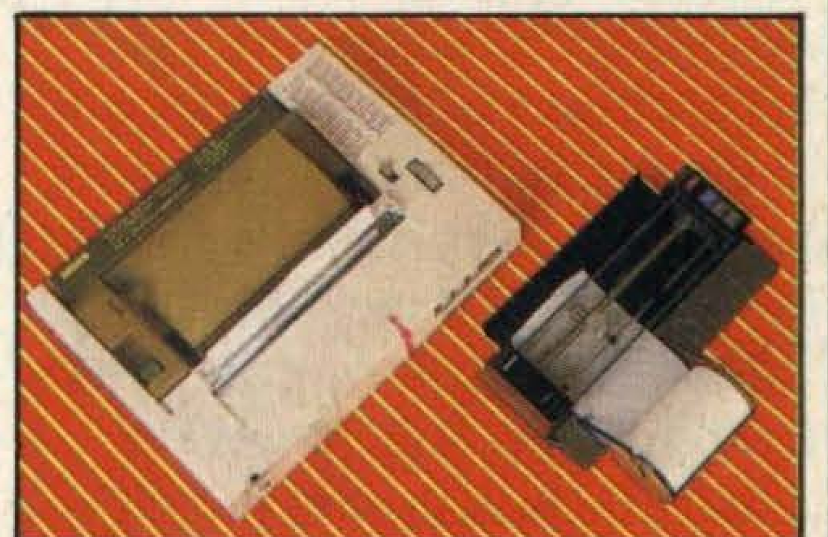
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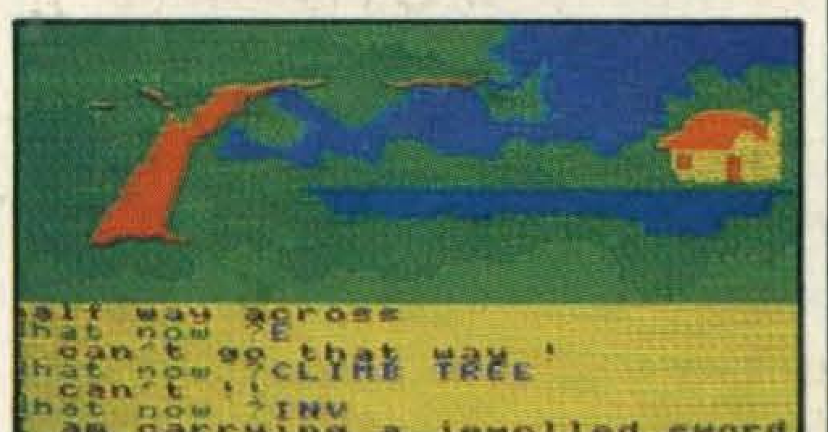
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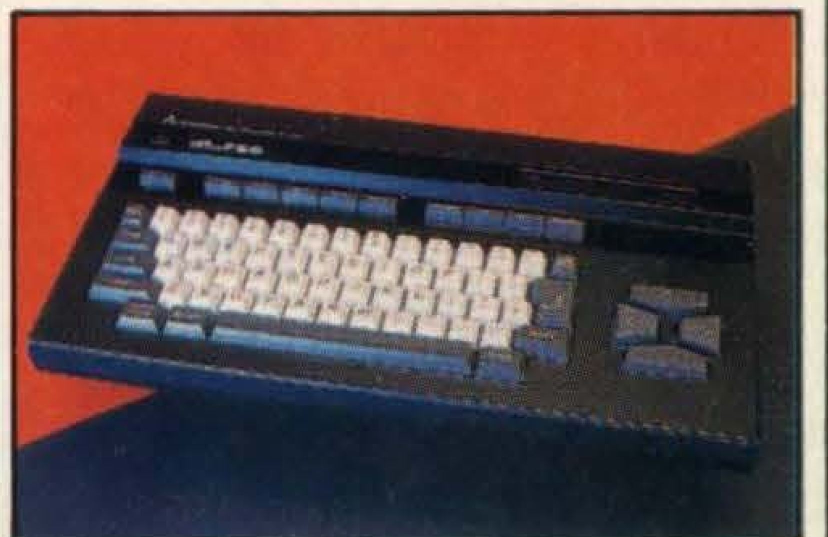
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Win yourself a Yamaha . . . p. 37


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Sanyo's MSX may be fun, but it's far from frivolous.

Our MPC 100 is the kind of quality machine only one of the world's leading manufacturers of business micros could produce.

You'll revel in its 64K memory, superb 16 colour graphics, and 3 channel/8 octave sound, operable by light pen or joystick options.

You can rely on Sanyo back-up as well. We've a factory entirely devoted to computer production. Other MSX manufacturers haven't.

So even if you do just want an MSX for playing games, you could end up a loser if you don't first see Sanyo, then decide. SANYO

When it comes to MSX, we're not just playing games



JUGGLING JOYSTICKS

Silica Shop, specialist in computer games equipment, has just imported several American joysticks designed to make games playing easier, cheaper and more convenient.

With the £4.95 Rapid Fire Control, an adaptor fitting between the joystick plug and MSX joystick port, the player adds quick firing facilities to the joystick. 'It's best for *Defender*-type games,' says a Silica Shop spokesman as 'you just press the button down and it keeps firing'. It can only be used to full effect with software programmed to allow rapid firing.

Two joystick extension leads are also available; the High Score 12 foot extension lead, which looks like a telephone lead, costing £4.95 and the shorter six foot lead at £3.95.

Left-handed players will be thrilled with the High Score South Paw (Leftie) and the Leftie left-handed joystick adaptor (no, we don't make these names up!) costing £2.95 and £3.95 respectively.

By twisting the joystick round 90 degrees, the fire button, usually located on the left-hand side, is switched over to accommodate the left-hander, as are all the internal controls.

Finally, the High Score double play Y-adapter saves a player buying a second joystick to play a two player game — by slotting the adapter between the joystick plug and two MSX joystick ports, it enables one joystick to operate via two ports. And all for £3.95.



The ML-G3 comes with twin disk drives and an RS232 interface

MITSUBISHI SHOWS OFF ITS NEW BUSINESS MICRO

Here's a sneak preview pic of the MSX computer Mitsubishi has up its sleeve for 1986.

No prices yet, nor a fixed release date — apart from a 'maybe April' from Mitsubishi's Steve Wankling — but the few details we have so far certainly whet the appetite.

As you can see, the computer comes in two boxes — the processor unit and the keyboard which are connected by means of an infra red beam.

The ML-G3 (as it will probably be called in the UK) will be an 'MSX Plus' machine, with built-in twin disk drives, RS232 interface, the second version of MSX BASIC, 64K RAM, 128K video RAM (with additional new screen modes) and an advanced sound chip.

There will be a rack inside the processor box for add-on memory cards.

Other features which *may* be incorporated include a home control interface and a video digitising interface.

The add-on memory facility, together with the disk drives and separate numeric keypad indicate that a prime market for this machine will be small businesses. Let's hope that they are not the only ones who will be able to afford it.

NEW JVC MICRO IN PIPELINE

Rumours of a new business oriented JVC computer are circulating and if proved true, it will probably be launched in the first half of next year.

A JVC spokesman told *What MSX?* that the new machine would incorporate a built-in disk drive and word processor, an RS232 as well as a Centronic printer port and like its current machine will probably include both composite video and RGB monitor outputs.

JVC hinted that the memory would be a lot more than 64K because, if launched in the UK, the new machine will be aimed at capturing a slice of the business computer market.

Whether JVC will be launching the machine in the UK remains to be seen.

SOVIETS BUY MSX

The Soviet Union has given MSX the thumbs up by placing an order worth over £2 million to equip its schools with micros.

Approximately 10,000 machines will be shipped over by Russia's Institute of Science and Technology once the restrictions on technological exports to the Eastern bloc are lifted late this year.

The news has come as a bitter blow to British companies Acorn, Sinclair and Memotech who were all hoping for a share of the contract.



Buy an HC-7 now and bag yourself £100-worth of software

FREE SOFTWARE FROM JVC

Competition is hotting up between the MSX manufacturers and JVC has joined in by offering free software with its HC-7 micros.

From September 1st until December 31st every customer who buys an HC-7 can choose a selection of software worth £100. Over 200 titles are available ranging from games to business and education applications. It sounds like a good deal to us.

The aim of the promotion is to generate more interest in MSX and match the competition from other manufacturers such as Mitsubishi which is offering to take £50 off the price of either the ML-F48 or ML-F80 in exchange for an old micro — whether it works or not.

JVC's HC-7 is a 64K micro and costs £279. It's available through JVC dealers and JVC's retail centres.

LEVEL 9's LATEST

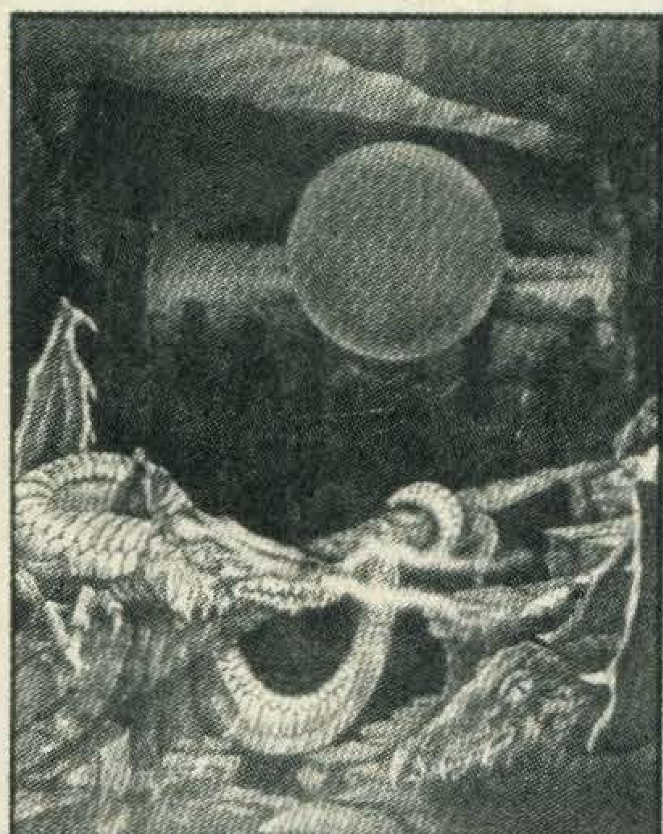
Two more thoroughbred adventure games, *Red Moon* and *The Worm in Paradise* are now available from the Level Nine Computing stable and cost £6.95 and £9.95 respectively.

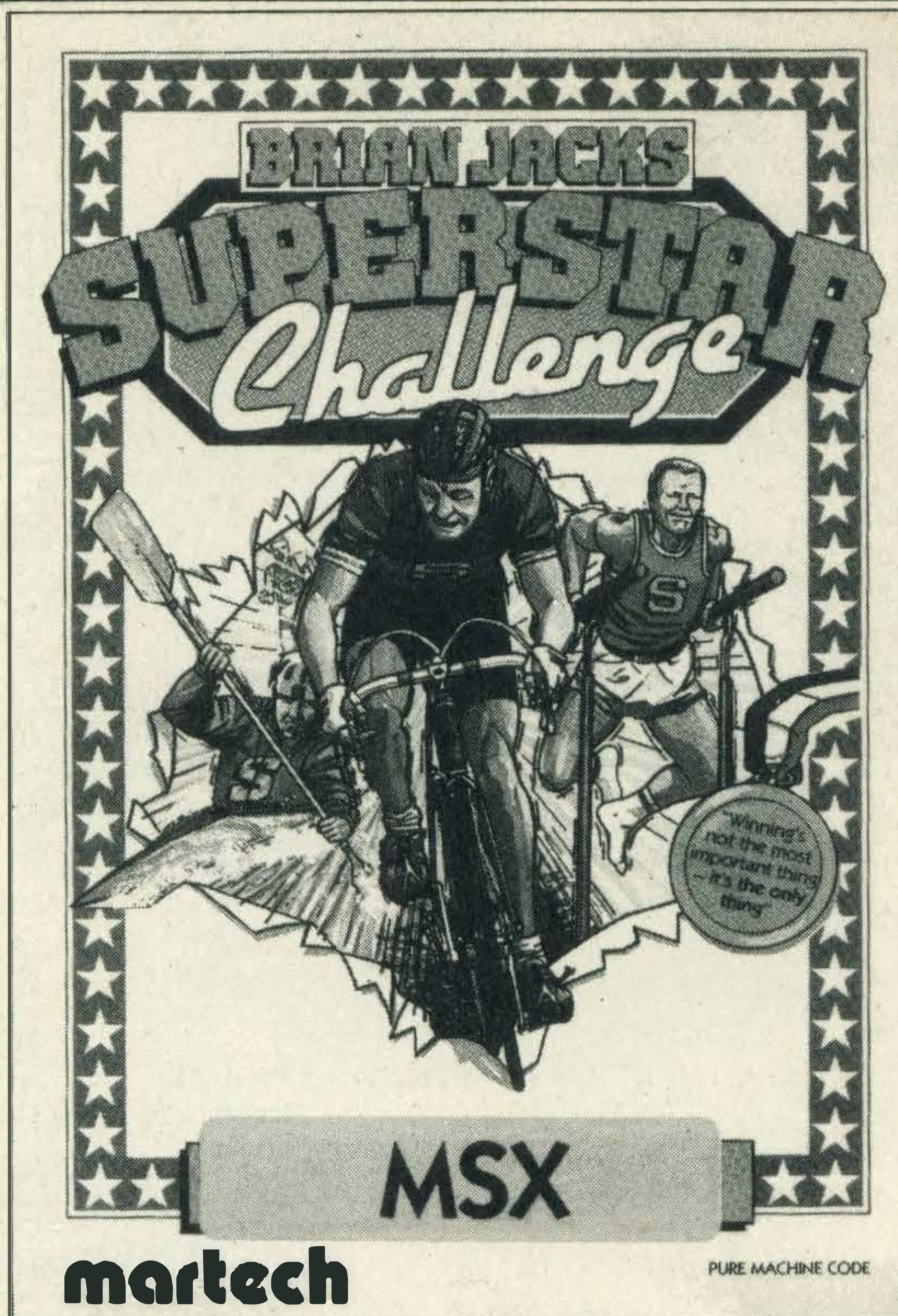
Red Moon is Level Nine's first attempt at a magical adventure. Graphics, spells, mythical monsters and magic all feature in this exciting adventure. The player starts off in a volcanic landscape, goes on to find treasure and must eventually find the long lost Red Moon crystal needed to bring Magik back to the land.

Concluding Level Nine's Silicon Dream trilogy of *Snowball* and *Return to Eden*, the text-only *Worm in Paradise* is its first political adventure. The player's aim is to move up the social ranks, gaining enough power and influence on the way up to rid the city of its dictatorship.

You can contact Level Nine Computing on (0494) 26871.

Red Moon





SPORTING SOFTWARE

Martech's three new MSX games all cost £7.95 and feature famous sporting personalities in strenuous on-screen activities.

In *Eddie Kidd's Jump Challenge*, the player guides the bike and rider over barrels and cars. The more obstacles negotiated, the better. Practice is important as dangerous headwinds, varying run-up distances and take off ramps complicate jumps.

Brian Jacks, judo and TV *Superstars* champion, stars in Martech's *Superstar Challenge*. Compete against Jacks in arm dips, squat thrusts, canoeing, cycling, football, swimming, archery and the 100 metres.

Helping Geoff Capes to regain his form as Britain's strongest man is the aim of *Geoff Capes Strong Man*. Once at the peak of physical fitness, the player helps him to compete in various sporting events.

Both the Eddie Kidd and Brian Jacks games are now available for MSX and Martech hopes to launch *Geoff Capes Strong Man* in October.

For more detailed information, Martech can be contacted on (0323) 768456.

GOING DUTCH

Dutch software house Micro Technology has started importing its business/utilitiy cartridge-based software into the UK. The first product, *MT-Base*, is a card index system with very fast response times, automatic alphabetical sorting and a 153 page comprehensive manual.

Fourteen fields can be set up on each card, and card selection can be made by any or all of them.

The company sees small businesses, serious home users, clubs and hobbyists as the main audience for this product and has accordingly included several sample card designs.

Other products from this stable include a Prestel comms package which incorporates an RS2332 interface, and *MT-Debug*, a programming tool.

Prices are £48 for *MT-Base*, £60 for the comms package and £39 for *MT-Debug*.

MT-BASE
a userfriendly card index for MSX-Computers



EIGHT-TRACK RECORDER FOR YAMAHA CX5M OWNERS

Digital Music Systems is launching DMS 1, an eight-track realtime sequence recorder on cartridge. Specifically programmed to enhance Yamaha's CX5M computer's internal FM Sound Synthesiser, the complete software pack costs £89.95.

Using DMS 1 with the CX5M, you can not only compose and record music at the the same time, but also play and record music. 'Its a real breakthrough,' says Philip Lyon, managing director of Digital Music, 'Up until now no one thought it possible to design software for the CX5M which enabled a musician to play and record music at the same time.'

'Luckily for us', he continues, 'Abdul Inbrahim, a customer of mine and now chief consultant of Digital Music, thought it *was* possible and programmed this software to prove it.'

Eight monophonic (single sound) tracks or a combination of monophonic and polyphonic (more then one sound) can be recorded and stored on disk. Lyon explains, 'Because the music can be stored on disk, a professional musician can store at least 20 tunes before a show and then access and play any one of them within seconds while on stage. Cassette storage is much slower and less reliable'.

The DMS 1 is menu-driven and has a number of other features: help screens; sounds can be accessed from disk, erased and rewritten in steptime or real time; parts or combinations of parts can be played back from any specified bar; any bar within a specified time — the smallest time slice is 1/32 of a crochet (quarter note) — can be corrected; a song can be transposed to any key; a built-in mixer facility alters the volume levels within a composition and it has a MIDI clock option.

'With this clock option,' explains Lyons, 'a CX5M owner with external MIDI synths will be able to play recorded or realtime music in time with a MIDI drum machine or any other MIDI instrument.'

Digital Music's future plans include a similar cartridge programmed to print out the music score once it's finished and a sound sampler. Any noise, a dog's bark for instance, will be analysed and reproduced perfectly. The player will then be able to compose tunes using that sound. No prices yet.

Digital Music Systems is on 061-437 4788.

THE YOUNG ONES

Fans of the BBC comedy *The Young Ones* are in for a treat as Orpheus Software will be releasing the computer game at the end of October.

Paul Kaufman, managing director of Orpheus, tells us that the game has been developed in collaboration with the *Young Ones* script writers and allows the player to take on the character of either Viv, Rick, Neil or Mike while the computer plays the other roles.

'We've spent eight months developing the title,' says Kaufman; 'For the first time in a computer game, characters will be able to interact with each other and speak using speech bubbles.'

Kaufman refused to give any more details except to say that the title breaks new territory and that artificial intelligence is behind it.

Along with versions for Spectrum and Commodore, the MSX release will cost £7.95.



MORE MEMORY FOR YOUR MONEY

Bee cards, memory modules the size of a credit card, have a program capacity of up to 256K and are now available together with Bee Pack, the MSX cartridge adapter, from Hudson Soft for about £14.95.

Mr Murai, managing director of Hudson Soft, tells us, 'We hope to launch five Bee card programs in September; two games — *Baseball Craze* and *Starforce* — and three business programs — a word processor, database and a spreadsheet called *T-Plan*'.

Three types of Bee cards will be available. Each card will contain a different type of memory suited for different sorts of programs.

MASK ROM Bee cards are used for home computer games, electronic publishing, printer font commands and sales promotion programs.

Bee cards with EPROM's can be used for programs such as medical health files, production and office data and customer information files, where information can be written to memory.

EEPROM Bee cards contain rewriteable memory and can be used for programs in which information retrieval is important — databases for example.

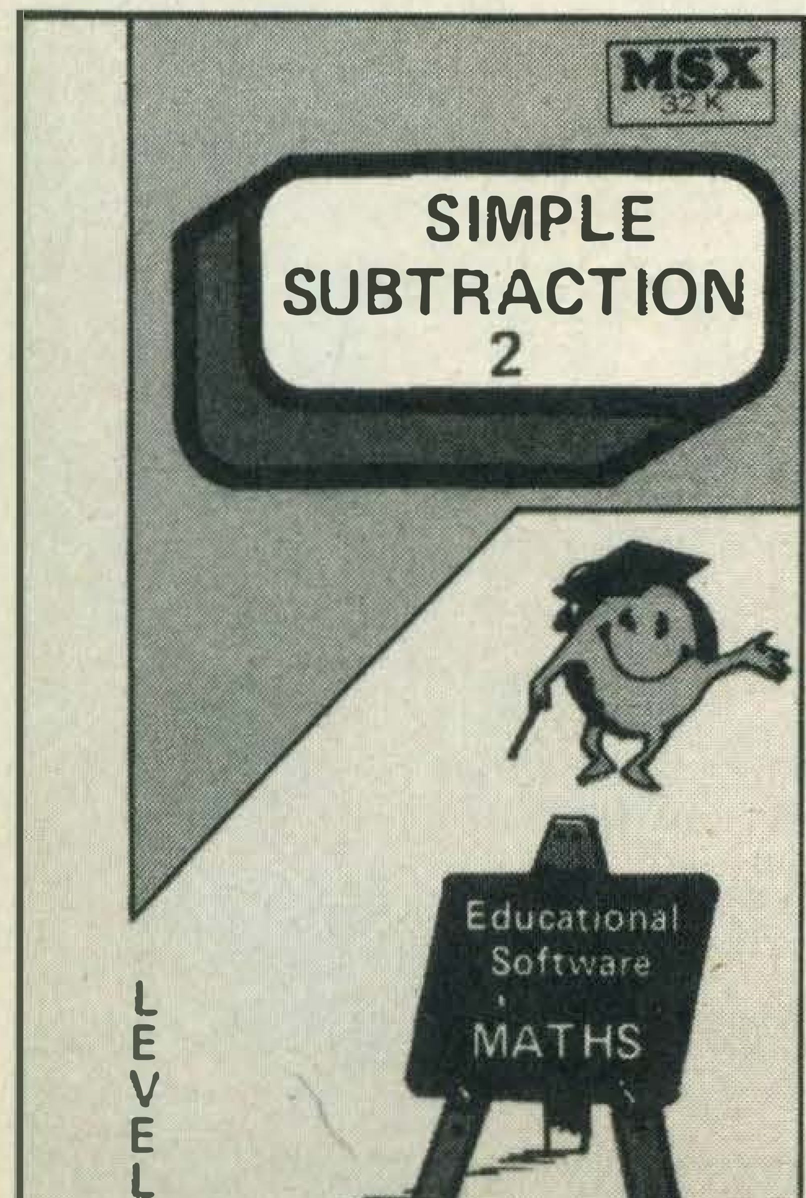
In Japan, Bee cards are being used in conjunction with various computerised systems to buy video games, book theatre tickets, reserve hotel rooms, for computer shopping and even for home banking. We're not quite at that stage here in the UK yet, but watch this space!

For further information, Hudson Soft can be contacted on 01-458 3310.

PLAYING TO LEARN

Nine new titles have been added to Mentor Educational Services' existing range of 23 mathematics titles; *Tens and Units, Simple Subtraction 2, Introduction to Shapes 1, Introducing Fractions 1 & 2, the Rectangle, the Square, the Triangle and Percentages.* They all cost £9.95.

These titles are intended for several age groups. According to John Howard, Mentor's managing director, 'Eventually we hope to have a suite of 40 mathematics programs covering the entire primary and post primary curriculum'.



The company is currently translating its mathematics titles into Italian, French and Spanish as 'MSX is doing so well since Philips launched its MSX over on the continent'.

Mentor specialises in educational MSX software and has a variety of programs planned for the future, including a set of 20 titles dealing with English language. Each one costs £9.95.

Finishing touches are just being put to a suite of 12 physics programs aimed at 'O' and 'A' level students and Howard intends to market these on disks — but not yet. He explains; 'We are waiting for more MSX disk drives to come into the country before committing ourselves to using any particular disk size. We want to see which ones become most popular'.

Eventually all the mathematics and language titles will be on disk and sold as educational courses.

Spectravideo is Mentor's distributor in the UK and can be contacted for more detailed information on 01-330 0101.

WORDS IN YOUR POCKET

MicroPro's *Pocket WordStar*, a condensed MSX-compatible version of *Wordstar* and *Mailmerge*, is now available from Cumana on 3.5 inch disks for £119.

Intended for both business and home users, *Pocket WordStar* has a number of useful features. It will create, edit and print documents in any specified quantity. Facilities for formatting text include underlining, bold, centering, tabulation, insertion, overtyping, headers and super script.

With *Mailmerge*, labels can be addressed, enabling one letter to be sent to as many addresses as desired.

Robin Oliver, MicroPro's managing director tells us, 'We felt that the development of this exciting new growth area (cheap quality software for home computers) was being hampered by businessmen not having serious reliable software products'.

He continues, 'Clearly, anybody considering the purchase of such a system for professional usage is very cost conscious, but would like the dependability and power of *WordStar* for word processing. We are delighted to be in a position to release *Pocket WordStar* offering full features at a suitable price'.

NODES OF YESOD

Nodes of Yesod (no, it's not a typing error!), Odin Computer Graphic's first MSX game, is a graphics adventure costing £9.95.

To rid the moon of an unsightly alien monolith hidden deep inside a labyrinth of inner passages, the player must move an astronaut through 256 lunar screens collecting several variously-shaped alchiems.

Before starting on his travels, the astronaut must first capture a moon mole.

Once the alchiems are gathered together, they form a key to the cavern where the monolith is situated.

Odin Computer Graphics is on 051-709 4462.

NEW MOUSE FOR THE MSX STABLE

At last, a mouse has been developed for MSX computers. Wigmore House has released the MS2000 mouse together with cassette or cartridge-based software, for MSX.

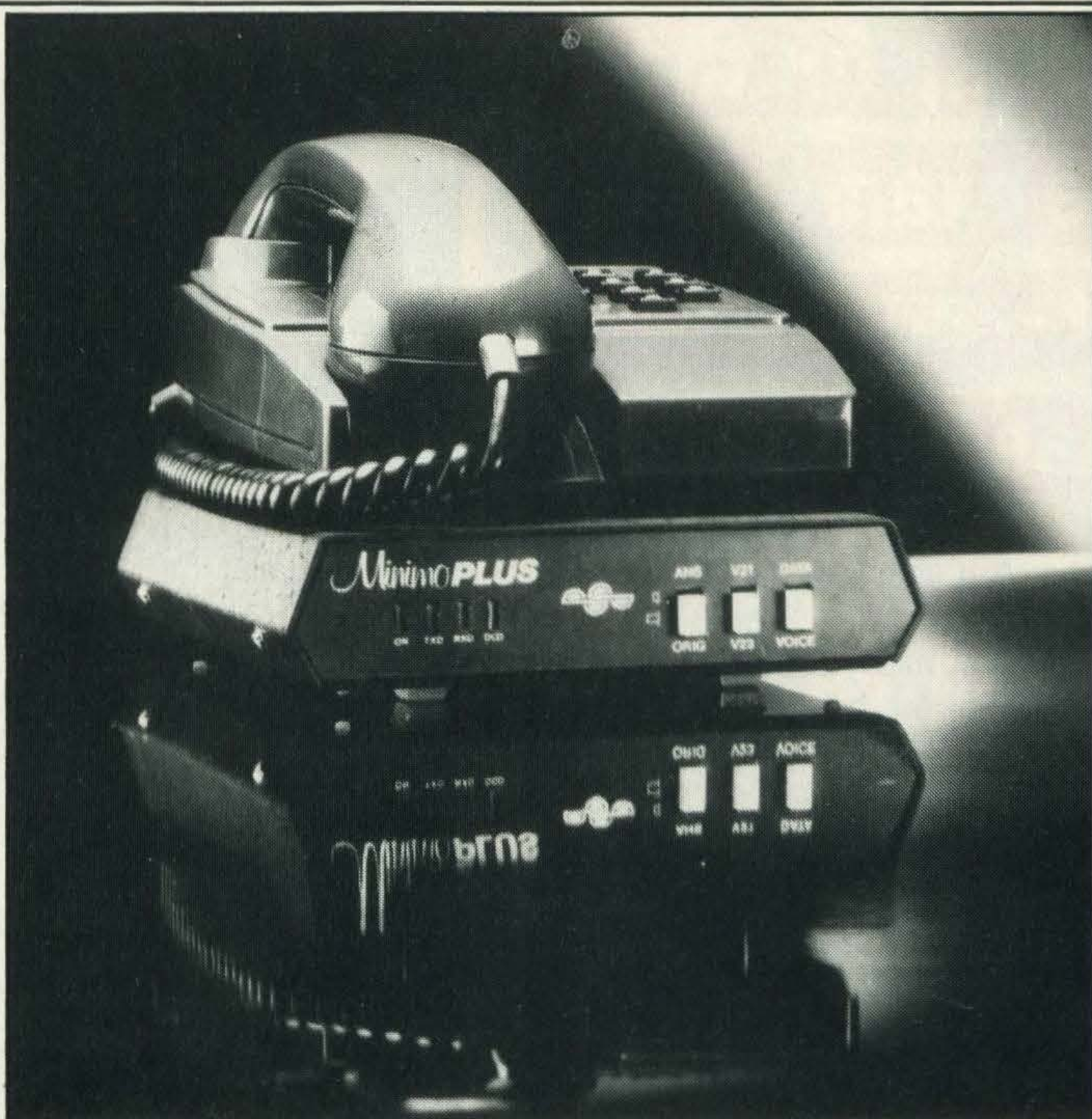
The mouse incorporates a rubber ball, allowing it to work accurately even on smooth surfaces, and two control buttons.

The software incorporates the usual standard shapes, free and dotted lines, straight lines and painting in 15 primary colours, together with such features as pan, mirror imaging, zoom, text, print, duplication and painting with 120 colour mixes.

Drawings can be saved and loaded from cassette. The MS2000 costs £78.90 inc VAT (£5 extra for cartridge) and Wigmore House can be contacted on 01-734 0171/2/3.



MSX's own lovable rodent



DATALINES MAKES IT EASY

Shopping round for plugs and printer cables can be a real pain, so why not let your fingers do the walking and flick through the latest directory from accessories supplier Datalines.

Datalines stocks a variety of printer cables, interfaces and modems which are suitable for MSX.

A quick phone call on the company's hotline, (0908) 311077 beats pounding the streets and is a lot less trouble in the long run.

If you'd like to have a browse through the product range, the directory can be obtained from Datalines, 68 Alston Drive, Bradwell Abbey, Milton Keynes MK13 9HB.

PHILIPS GETS SERIOUS ON RECORDERS

Dedicated data recorders are more efficient when it comes to loading and saving programs and Philips' latest model is no exception.

Its D6450 data recorder has been ergonomically designed and is geared towards the 'serious' computer user.

Features include a normal/reverse phase switch, touch sensitive control keys, LED indicators and a monitor switch.

The Philips machine is very similar in design to JVC's data recorder, but at £38 is less than half the price.

Further details can be obtained from Philips on 01-689 2166.



The D6450 — for 'serious' users

GOOD NEWS

Some good news on the printer front from two leading manufacturers.

Riteman has released a new F+ dot matrix model offering bi-directional printing up to 105 cps, a 96 ASCII italic character set option and, unlike most printers, paper feed from the front which prevents all that tangling with the cables.

Epson has cut the price of its RX100+ and FX80+ printers by £51 and £102 respectively. Shawn Goffe, Epson's distribution and marketing manager, says, 'The Autumn is going to be a busy period for dot matrix printers'. So if you're contemplating a purchase it's well worth shopping around — you could pick up a bargain!

LOEWE STARTS OFF WITH DOUBLE VISION

Two TV/Monitors, the 10 inch MCP 110 and 14 inch MCP 114, both costing £380, are now available from Loewe Opta, a German company new to the British market. It hopes to launch three more models by the end of the year.

The portable medium to high resolution MCP 110 has a flat square tube, SCART socket, full function digital remote control and a contrast filter. It's also accompanied by a 12V battery connector lead so you can use it from a car battery. This model is available in chrome or charcoal grey.

Loewe's MCP 114 has similar features except that it has a standard to medium resolution display. Tony Vernon, Loewe's sales director tells us, 'All the MCP 114s will probably be fitted with FSTs by the end of the year'.



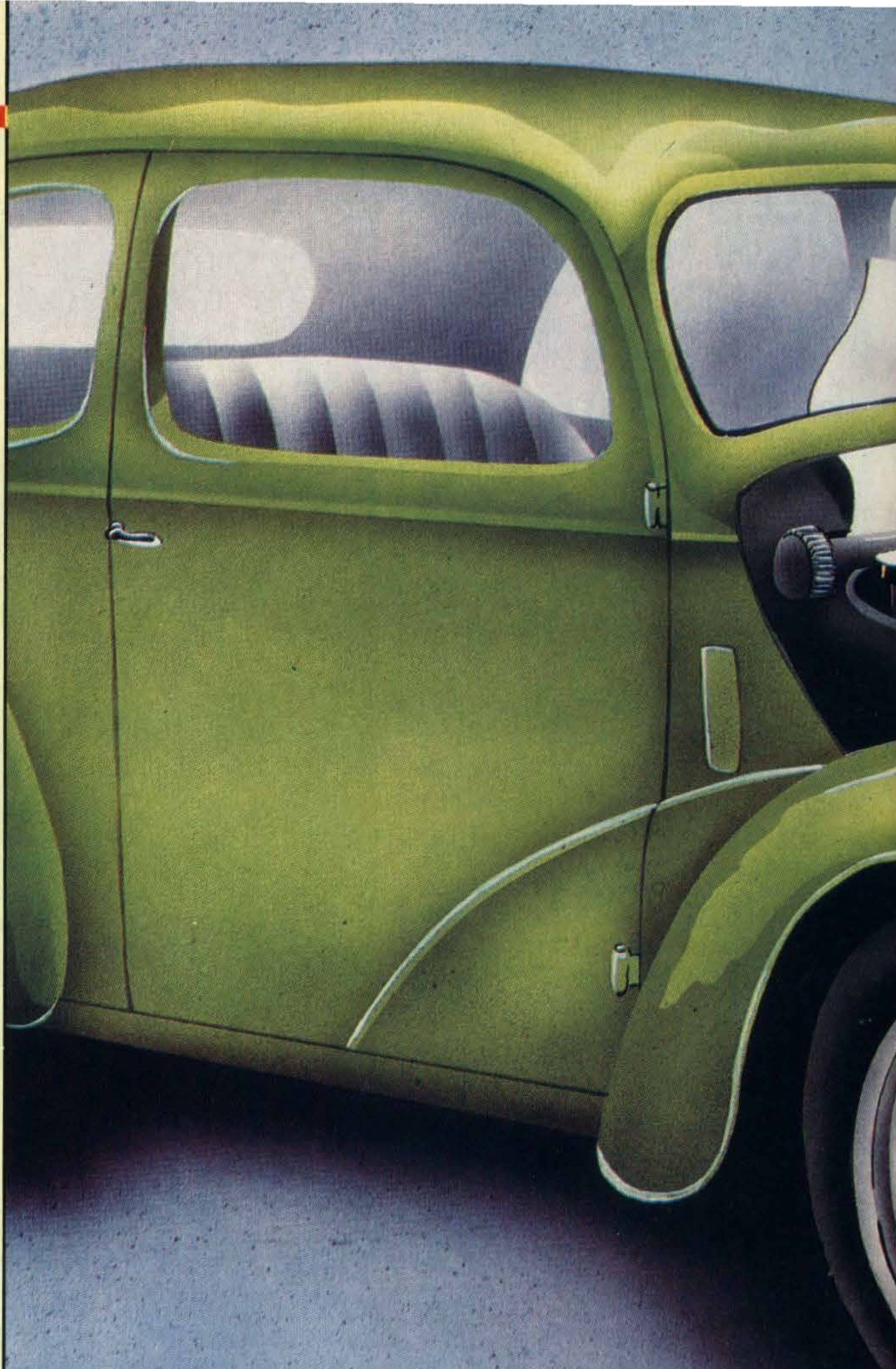
Commenting on the relatively high prices, Vernon explains; 'Loewe is not interested in selling everything off cheaply, we spend far too much on R&D (Research and Development) getting our products as innovative and sophisticated as possible'.

Vernon stresses that Loewe only intends to sell its products in specialist consumer electronic shops, avoiding any possible conflict with national multiples like Dixons and Lasky's.

Loewe has several more products lined up for us. TV/monitors in the Loewe pipeline include the 15, 21 and 27 inch TV/monitors, all utilising flat square tubes, which provide quality, distortion free displays. Loewe hasn't decided on exact launch dates or prices, but Vernon expects them to sell for under £550.

Contact Loewe Opta on 01-847 3641.

MSX is gearing up for the year ahead. We examine its past, present – and what the future has in store



In the autumn of 1984, MSX computers finally arrived in the UK. Critical reaction was underwhelming. Outdated and ancient, based on an old chip, merely competent and definitely overpriced — those were typical comments. If you'd been Kay Nishi, the man who invented MSX — or one of the giant Japanese companies who are making MSX machines, you'd have had every right to feel depressed.

Add to that the fact that Christmas 1984 was nowhere near as exciting for micro sales as 1983, and that no home computers (with the possible exception of Amstrad) sold as well as the manufacturers expected (just look at the problems Acorn and Sinclair have been having this year — they can be traced back to last Christmas), and you have a pretty bleak picture.

So why hasn't MSX gone the way of Dragon, Oric and the others? Why are you reading a magazine called *What MSX?* The answer's easy. MSX is a 'standard' — and by and large standards have never had a smooth start to their lives.

The history of record players is a good example. You might imagine that records have always spun around at 33⅓, 45 or 78rpm. They didn't. In the early decades of this century, records spun round at whatever speed the manufacturers thought they could get away with — much like yesterday's home computers. The standard of 78rpm was only settled on because one brand of clockwork motor — the most widely used in those early record players— spun the disc at that speed.

MSX is a bit like that, except that the MSX 'clockwork motor' is a particular set of chips arranged in a special kind of computer architecture. Those chips, and the way they're connected, are what make up the MSX standard.

But why should a 'standard' be important? Over the last few years, many different kinds of computer have sold in large numbers — and they certainly haven't been standardised.

A standard may not be important to one computer user, content to sit in front of his TV playing his millionth game of *Chuckie Egg.* As long as his computer works, and he can get programs for it — the fact that it's non-standard doesn't really matter.

But if our user wants to exchange programs with a friend, or to master a programming language that can be used on lots of machines, or doesn't want his machine to become obsolete when its manufacturer has financial problems — then the idea of a standard is bound to be attractive.

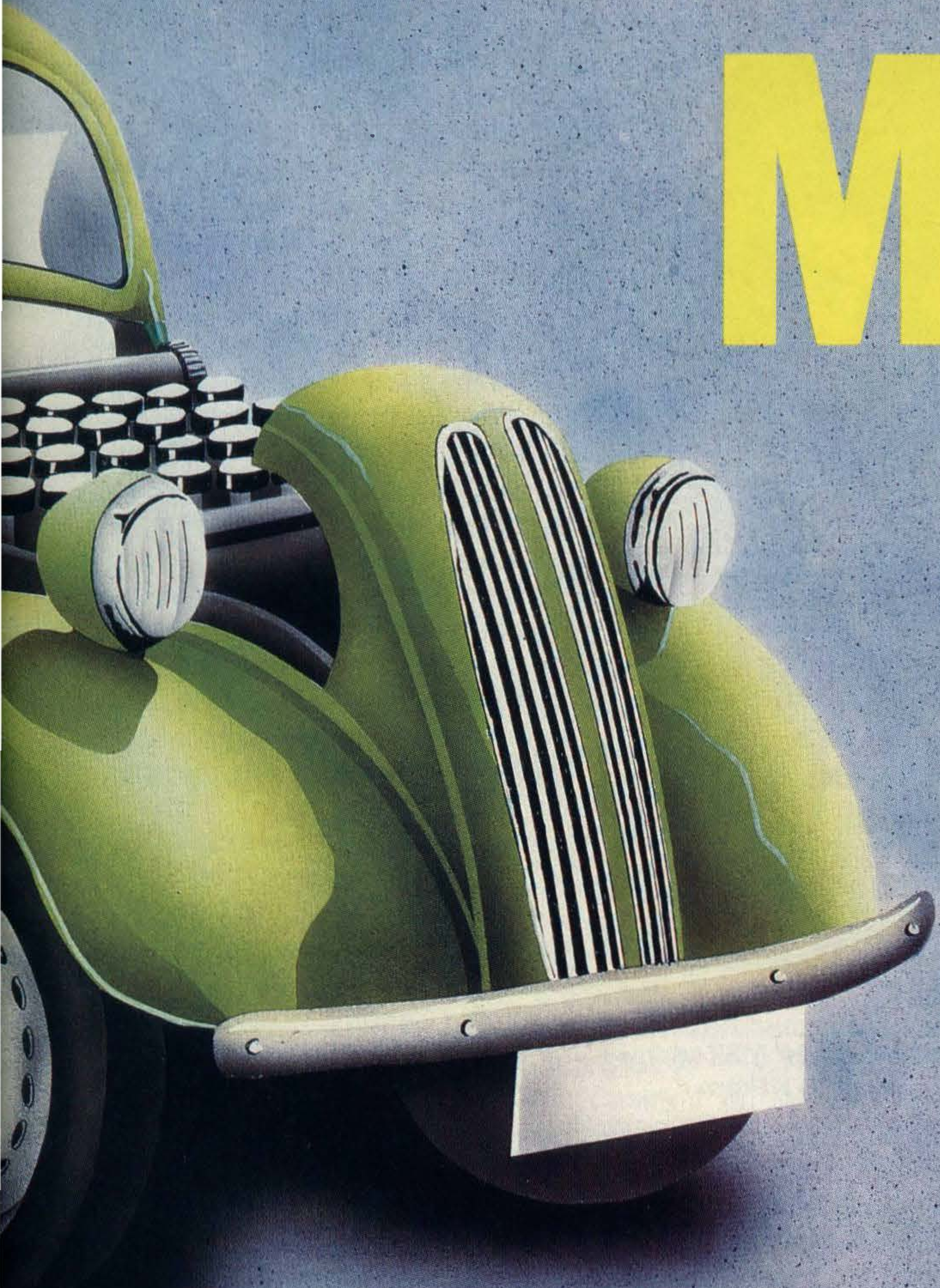
All of the above is certainly true, and MSX users can be grateful that they are part of a standard. But MSX wasn't born because some of the world's biggest consumer electronic companies were suddenly fil-





Illustration by Kevin Knight

MOVING INTO TOP GEAR



led with an altruistic desire to help computer consumers.

MSX was born with the help of Hong Kong based computer manufacturer Spectravideo, a Japanese workaholic called Kay Nishi (a stalwart of the Japanese computer software/ publishing house ASCII-Microsoft), and the desire of huge Japanese companies like Matsushita (Panasonic to us), Sony, JVC, Sanyo and Hitachi to create products that would sell in the booming computer markets of the USA and Britain — not to mention the rest of the world.

The idea of a standard was attractive. In the last 10 or 15 years, the Japanese have learnt a lot about competing in Western markets — notably from the video market, where quite a few companies have had their collective fingers burnt by backing the 'wrong' technology.

What could be better than an agreement to make all their machines compatible? JVC's disk drives would work with Sony's computers, and Matsushita's software (or anybody else's) would work on anybody's machine.

'Nigh on a million machines have been sold in Japan in the last two years or so'

Nobody would be taking a gamble that their technology would be the one that the public would go for. The risk would be greatly reduced. And so MSX was born. The first machines saw the light of Japanese day late in 1983, and hit the UK market in autumn 1984.

So far, MSX has done well in Japan. Nigh on a million machines have been sold there in the last two years or so — but the Japanese market hadn't really been exposed to the Sinclair, Atari, Commodore and Acorn machines that had fuelled a boom in Britain.

In a sense, the going was easy (and remains so). In other markets — notably in Europe — where the computer boom hasn't yet happened, MSX is also making its mark. But in Britain, where the boom had already gone bang, the going was definitely a lot tougher and in the USA, where the computer market below machines like the IBM PC has been chaotic, MSX hasn't yet been launched.





This autumn sees the release of several 'enhanced' MSX micros including the Toshiba HX22 and the Spectravideo X'Press

No easy birth for this standard, then, in the computer markets commonly thought to lead the world — and particularly thought to lead the world in terms of product innovation.

And innovation seems to be the name of the game in micros at the moment. There are all these 128K memory machines (which, as they are home computers, probably only means that Pete Austin of Level Nine, arch adventure writer to the masses, will be able to write even bigger adventure games), plus 16-bit processors in some, disk drives in others. All of this is great, if the machines get any software, and if the world can find any real uses for them.

MSX is not all bells and whistles. At its heart it's 'tried and trusted' technology — and that alone has earned it far more than its fair share of criticism from computer pundits who ought to know better (and who like the Amstrad, which isn't much different).

Programmers the world over can make the MSX processor (the venerable Z80) jump through hoops — and on the best MSX software, it shows. But the biggest advantage of being tried and trusted (and backed by the world's biggest consumer electronics companies) is that the makers can find 'real' uses for their machines.

MSX computers can be excellent games machines, excellent business computers, excellent musical devices, excellent video devices, even excellent controllers of microwave ovens. You'll find examples of most of these within this issue of *What MSX?*

When people start making hi-fis, video recorders and videodisc players, not to mention other bits of home hardware that can interface with computers, the computers they'll be designed to work with will be MSX. That's the main reason why there's a persistent rumour that IBM is interested in MSX.

Big Blue, as it's known to its friends and enemies, has set *de facto* standards in business computers, but knows full well that the people who set standards for 'home interfacing' with things like video recorders will be the people who make video recorders. That isn't IBM — it's Sony and Matsushita. And they've standardised on MSX for their home computers.

Standards aren't just important for the computer manufacturers and the end users. They're pretty useful for software companies. Instead of having to write different versions of every program for every different machine, they can write just one, for all MSX machines in the UK. Those programs will also work on any MSX in the world — with only minor language and video changes to worry about.

So, for the first time, software companies find themselves with a truly international market — and most of the software firms who've been supporting MSX since its arrival in the UK have been happy (and surprised) by the quantity of overseas orders they've been getting for their products. (This magazine will be read in just about every country where MSX computers are on sale. *Bonjour monde!*)

We've already seen that MSX hasn't had an easy time in its first year in Britain, but what exactly has been going on? MSX computers have arrived from Canon, Goldstar, JVC, Mitsubishi, Network, Panasonic, Sanyo, Sony, Spectravideo, Toshiba and Yamaha. You can add Pioneer to that list for this autumn, and companies as big as Philips and Hitachi are waiting in the wings.

Most of the above machines are fairly 'ordinary', 64K memory machines (barring a 32K model from Mitsubishi), with the most honourable exception of Yamaha's 32K CX5M.

Yamaha, of motorbikes, musical instruments and hi-fi fame, has produced a £500 MSX computer which incorporates a full FM (frequency modulated) synthesiser. Nik Kershaw reviewed it for our sister magazine *MSX Computing* last autumn, and rated it as good as synthesisers costing twice as much. For musicians who want a computer, or computer buffs who want a synthesiser, it's a brilliant compromise. *Chuckie Egg* and Bach!

This autumn, there's a lot of action in store. Toshiba has a machine with built-in word processor and RS232 communications port. Spectravideo's new model has a built-in disk drive that makes it stunning value for money.

Pioneer, making its first foray into the UK computer market, has an MSX machine with full video overlay capability. What's more, if you plug the Pioneer into one of the company's laserdisc players, you

can have 'interactive' video games, where the laser disc supplies extremely detailed backgrounds while the computer overlays graphics and controls the game. Just like the best arcade stuff, especially if you shove the sound output through your hi-fi!

You can add to that lot a host of peripherals like disk drives, graphics pads, MIDI (musical instrument) interfaces and printers (many of which are reviewed in these pages), and a continuing growth in quality software.

You'll find a full list of available software at the back of this issue, as well as our pick of the best stuff around, but you can rest assured that whatever your requirements, there'll be something for you. In fact, with more disk drives becoming available (and at realistic prices), the possibilities for serious business software are dramatically improved.

The MSX disk operating system (MSX-DOS) is very similar to one of the standard business operating systems, CP/M, which opens the door to literally hundreds, if not thousands, of 'real' business programs. These should start to appear towards the end of this year and throughout 1986. (This article was written on a disk-based MSX word processing program from Holland.)

'During early '86 we should see the first of a 'new generation' of MSX computers'

During early '86 we should also begin to see the first of a 'new generation' of MSX computers, clearly designed with small business users in mind, but also capable of some fairly stunning things.

Dubbed MSX II, but perhaps best called MSX Plus, these computers will be fully compatible with existing machines, capable of running all their software, but with some interesting additions. These are mainly to do with the graphics the machines can display—which will rival some of the 'trendy' machines. It may be possible to upgrade existing MSX machines by a plug-in cartridge.

The main use that this improved graphics capability will be put to in the early days will be the handling of TV and video images, though pretty amazing games will be possible too.

In the medium term it offers the possibility of the so-called WIMP environment (window-icon-mouse — sort of electronic desktop on screen), and some way beyond that there may even be 16 and 32 bit versions of MSX, using processors much more powerful than the 8-bit Z80 inside current machines.

By then there's a very distinct possibility that MSX standard computers will be cropping up inside all sorts of home appliances — from microwave ovens to telephones, video recorders and hi-fi systems. You then have the prospect of all these things talking to each other and operating under central control. You could, for instance, notice the snow falling outside your office window, and then ring home to tell your central heating to wind itself up a few degrees. Or you could be ringing home to tell the video recorder to record *Dallasty*, and the microwave to have a steaming plate of lasagne ready when you get back.

It might sound far fetched, but the possibility is already being realised in some areas, and if it's ever to become a commercial reality, it will be MSX that's at the heart of it all.

Buying an MSX computer now is not just recognising that you're getting value for money with a tried and tested system, it's also getting yourself ready for the home of the future where computers have real uses. ■



Nik Kershaw on Yamaha's CX5M combined computer and music synthesizer: 'For £600 it's amazing!'

MSX SPECIFICATION

The heart of MSX is its specification, which you'll find listed below. It's worth pointing out that this is a minimum specification. All MSX machines meet this spec, but most go beyond it in significant areas — either extra memory, or extra built-in program storage (ROM, as opposed to RAM, or *read-only memory* as opposed to *random access memory*).

For example, all the UK MSX machines have a minimum of 32K of RAM, whereas the spec only asks for 8K. Other machines, like the Sony or the new Toshiba, have extra programs built-in — in Toshiba's case a nifty little word processor. Pioneer's machine has an extended BASIC, called P-BASIC, which allows the user to control the machine's video capabilities from BASIC programs.

Central processor: Zilog Z80A or equivalent, working at a 'clock speed' of 3.579545 MHz.

Memory: 32K MSX system software (includes BASIC) in ROM, 8K RAM. Both extendable—RAM up to 64 x 64K (in 'pages').

Video display processor: Texas Instruments 9929A or equivalent.

Display modes: High resolution — 256 x 192 pixels. Text 40 characters in 24 lines. 16 colours maximum. 32 programmable sprites.

Sound generator: General Instruments AY-3-8910 gives three independent channels and 8 octave range. Controllable from BASIC (Music Macro Language).

Cassette interface: Frequency shift keying modulation at 1200 or 2400 baud (bits per second).

Character sets: Alphanumeric, European, graphic.

Keyboard: 73 keys minimum

Expansion slots: Minimum of one cartridge port and expansion bus.

Joystick: Minimum one socket, 'Atari' compatible (all UK machines have two).

System clock: battery backed CMOS.

Communications interface: RS232. Only the Toshiba HX-22 and Spectravideo X'Press have this fitted onboard at the moment, though RS232 cartridges are available.

Printer interface: Centronics parallel port — one of the industry standards.

Programmable peripheral interface (PPI): Intel i-8255. This chip controls the input and output to cassette recorders and disk drives — the way the machine talks to the world.

COMPUTER TALK


Illustration: Mark Arundale

You have to talk to your computer in its own language. But micros speak more than one tongue, explains Tim Markes

It will not have escaped your notice that MSX computers have BASIC included in the package. If you are relatively new to computers, you might just ask yourself a couple of pertinent questions. What is this BASIC thing and why do I need it?

Well let's face it, many home computer users do not need BASIC and may never use it. These are punters whose sole computer activity consists of loading and running, from tape or disk, software which has been written by someone else.

For many MSX owners, though, the temptation to 'create an intelligent machine' themselves proves irresistible. To achieve this, we need to get a sequence of logical instructions (a program!) into the computer. We must tell our micro about this program in a language which it will understand. The process will be less painful if we can also understand the language quickly and easily ourselves.

The MSX computer is based on the Z80 microprocessor, one of the most popular chips for 8 bit home computers. The Sinclair Spectrum, and the Amstrad are also designed around the Z80, for example.

The type of processor is important. Some programs are inevitably time or space critical — fast moving graphics, communications, even MIDI music sequencers are typical.

For efficiency, these programs (or the key routines, at least) must be in machine code — which is specific to the processor and not the easiest language to grasp for a beginner. For a clear explanation of machine code and the matching *assembly language*, see the series in *MSX Computing* by Adam Denning from the February '85 issue.

Programming in machine code involves an understanding of strange things like bits, bytes, (nybbles would you believe), registers, binary, hexadecimal, stacks, flags, parity/overlow and an awful lot of numbers. In practice you would use an assembler which allows you to employ short alphabetic mnemonics and labels instead of meaningless hexadecimal numbers.

Disassemblers look at machine code and translate it back into assembly language — useful for investigating the contents of programmed chips (ROMs) legally or otherwise. Kuma and Hisoft both market assembler and disassembler packages for MSX. If you want to program in a more friendly language without shouldering this burden, however, read on!

> **'For many MSX owners the temptation to create an intelligent machine themselves proves irresistible'**

Beginners All-purpose Symbolic Instruction Code (BASIC) is your saviour. To give you an immediate flavour of the language, it contains many such friendly BASIC keywords as:

INPUT, PRINT, READ, DATA

Even its decision making instructions are easy to understand — for example:

IF N1>N2 THEN GOTO 150 ELSE PRINT N2

Just as COBOL (COmmon Business Orientated Language, 1959) remains the standard programming language for large mainframe computers in the business world, so BASIC is now the most commonly offered and used programming language for micros.

MSX micros are supplied with a BASIC interpreter permanently resident in ROM (Read Only Memory). Whenever the computer is switched on, therefore, it is immediately ready to interpret any BASIC programming instructions you type in. Your statements must be clear and unambiguous if you expect to be understood and you will find that a 'grammatical' mistake is abruptly rejected as a *Syntax error*. Anything more polite and informative than this would take up more memory space and leave you less room for your own (or bought-in) programs.

The popular micros are not all based on the same microprocessor, but they do share this common BASIC programming language. Does this mean that any program written in BASIC will run without alteration on any micro which includes a BASIC interpreter? Well unfor-



tunately not, as you might have guessed.

Each manufacturer has its own dialect of BASIC. With a very powerful 'computer' sitting on our shoulders, it is not difficult for us humans, with a little experience, to understand any of these BASIC dialects (Spectrum, Amstrad, MSX etc). The humble microprocessor, on the other hand, can only understand the dialect of BASIC expected by its BASIC interpreter resident in its ROM.

The unique advantage of MSX BASIC is that, for the first time, a number of different manufacturers (Sony, JVC, Toshiba et al) and the owner of the copyright (Microsoft) have agreed a dialect of BASIC to be issued on all of the manufacturers' MSX machines.

'You could try swapping computers for a week and make up your own mind about MSX BASIC'

This means that an MSX BASIC (or machine code) program will run on an MSX computer of any manufacture, whereas Sinclair Spectrum owners cannot run their (Z80 based) BASIC or machine code programs on a (Z80 based) Amstrad!

BASIC in whatever dialect is nevertheless a universal micro language which brings considerable benefits. An ideal introduction is the series in *MSX Computing* (back issues available); but you can also get a lot of interest and ideas from reading books which support computers other than MSX. Look out also for articles or magazine series which specifically deal with the (minor) BASIC conversion problems between machines.

You could try swapping computers with a friend for a week and make up your own mind about how MSX BASIC compares with other versions.

If you want to upgrade to a more powerful and sohisticated machine — perhaps for a small business, the odds are that it will be supplied with BASIC — a facility you will recognise immediately.

It would be great to say that MSX BASIC is the best of the various versions used on popular micros — but we won't be tempted! It's not easy to make a simple judgement of that kind when it comes to BASIC — and many other computing options for that matter. The main reason is that every facility has a cost; frequently this is in terms of space or time (rather than money).

BBC BASIC has long been regarded as the most comprehensive BASIC on the home computer market today. Yet the MSX implementation, while very different, has attracted equally ardent supporters. Each has different strengths, and for the average home user MSX BASIC is prob-

ably superior because of its strong sound and graphics commands. At the other end of the scale, the Commodore 64 version could perhaps be described as McEnroe BASIC — uncivilised and a pain in the backside?

Both the BBC and the Amstrad permit long names for variables (memory locations), which make programs easier to understand on first reading.

On the other hand, multi-character names use up more valuable memory space and take more time to type. Most programmers would in practice use the long name facility only rarely and the two character variety used on MSX is quite sufficient. You can use long names with MSX BASIC, but only the first two characters are treated as being significant.

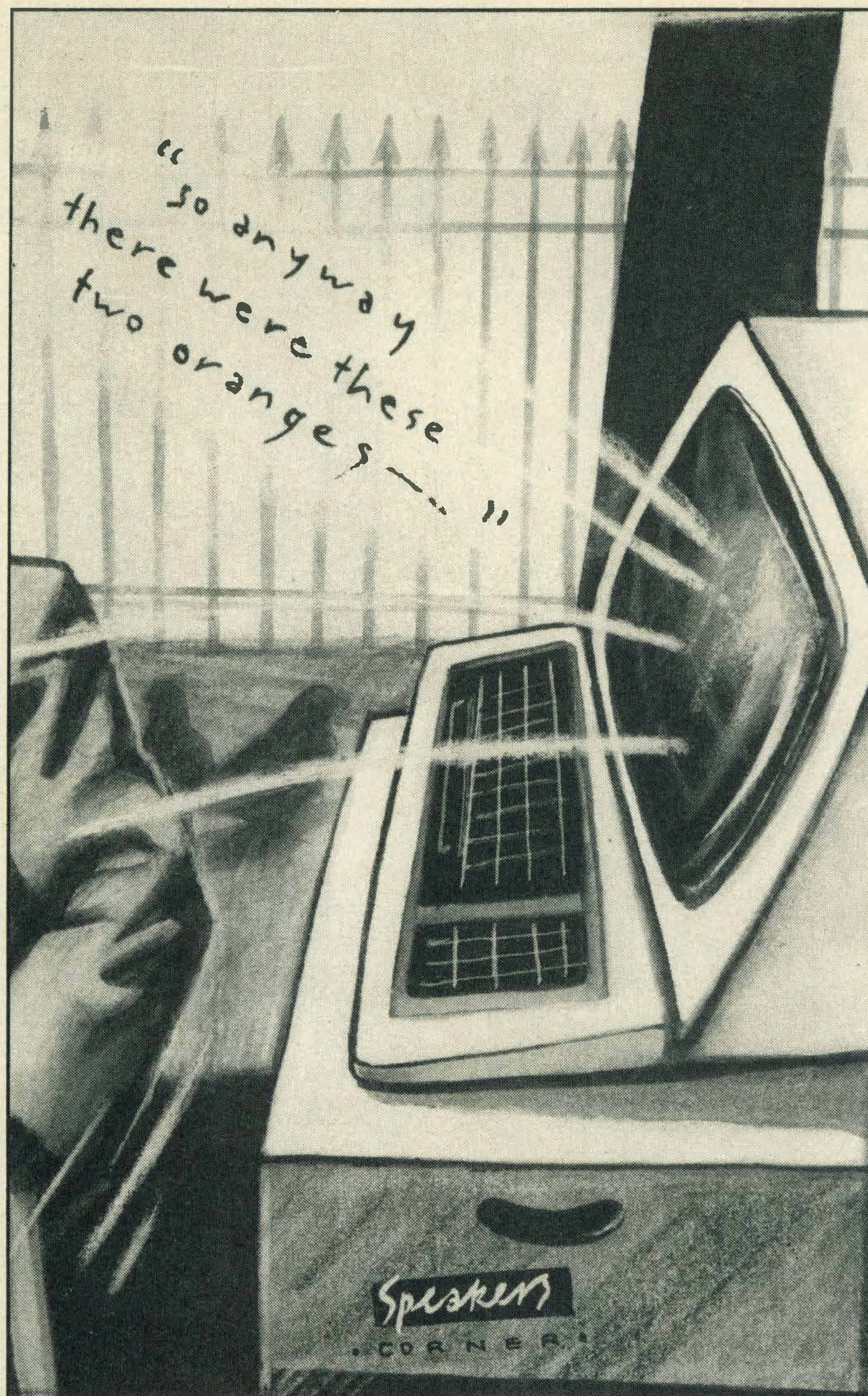
BBC BASIC alone implements procedures, which positively encourage well structured programs. However, you can certainly achieve this using the simple GOSUB (subroutine) system used on the MSX and most other micros.

MSX micros also have excellent BASIC editing facilities and many helpful tricks like automatic and revised line numbering which are not always available. Graphics and sound handling (areas where you will find the most divergence between different non-MSX manufacturers) are also well supported. Who would not be reassured to see the keywords SCREEN, COLOR, DRAW, LINE, CIRCLE, PLAY in their manual?

'MSX micros also have excellent BASIC editing facilities and many helpful tricks available'

But all this talk about BASIC obscures one important fact — computers are essentially data crunchers, and don't really mind what language they're speaking. And other languages are available.

By this time you're probably asking how BASIC compares with other languages and are they available on MSX? In fact, compared with the others, BASIC is quite youthful — the first implementation being in 1965 (Kurtz and Kereny). BASIC was a much simplified and anglicised version of the first major high level machine independent language FORTRAN (FORmula TRANslater) developed in the late 50s mainly for scientific and engineering applications.



After many refinements, Bill Gates and Paul Allan wrote a BASIC for the first micro, the MITS Altair (based on the Intel 8080) in the mid-70s. This led to Microsoft and the Microsoft corporation headed by the still youthful Mr Gates.

FORTRAN requires much more memory space than BASIC — typically 64K RAM plus two floppy disk drives — too much for the average micro configuration. Another major difference is that, whereas a complete FORTRAN program must be compiled into machine language before it can be run, BASIC is interpreted line by line. The latter leads to simple 'interactive' programming and, just as important, fast debugging (correcting faults).

PASCAL was derived by Nikolaus Wirth (1970) from the hierarchically structured ALGOL 60 (1960) and named after the French mathematician Blaise Pascal. It is a procedure orientated language which supports well designed, carefully structured programming.

Go forth

At one time PASCAL seemed destined to be the favourite microcomputer language of the eighties, but this seems more doubtful now. There are versions available for most of the leading micros including business machines. Hisoft has produced PASCAL for MSX at £29.95.

FORTH was originally written (Charles Moore — 1960) to control an observatory. It is a very individual language (in every way) and its fans are very enthusiastic! Here there are only a small number of predefined keywords — known as *primitives.* You make up the rest of the language as you program (no kidding) in terms of these primitives.

FORTH can be used interactively like BASIC (unlike PASCAL) and the resulting code is reputedly fast enough to be suitable for arcade games.

'Computers are essentially data crunchers and don't mind what language they're speaking'

Understanding someone else's program (or even your own), however, can be a major problem. Again there are versions of FORTH for most micros including Z80 based models and Kuma FORTH is available for MSX now.

Perhaps the easiest language name to remember is C, developed (in 1978) at Bell Laboratories to write the UNIX operating system. C allows the programmer close access to the hardware features, but has high-level elements — and is portable between machines. It has fanatical support (or opposition) and is mainly used for writing other systems software (compilers/operating systems). A version of C for MSX is due out from Hisoft later in the year.

LOGO (1960 — Seymour Papert at MIT) is most well known for turtle graphics and the education field. Most reputable implementations should also include *list processing* inspired by LISP (1958 — McCarthy).

The process of directing the progress (North South East West etc) by program of an imaginary turtle, with its pen (tail?) on or off the screen, helps the 'child-centred learning' of geometry, maths — and computer programming.

Advocates of LOGO in schools, such as Boris Allan, are currently arguing its relative merits with COMAL supporters. But LOGO undoubtedly has both a distinguished past and a firm future. A wide variety of implementations are available covering most micros and a LOGO for MSX is marketed by Kuma. ■

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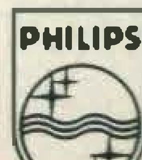
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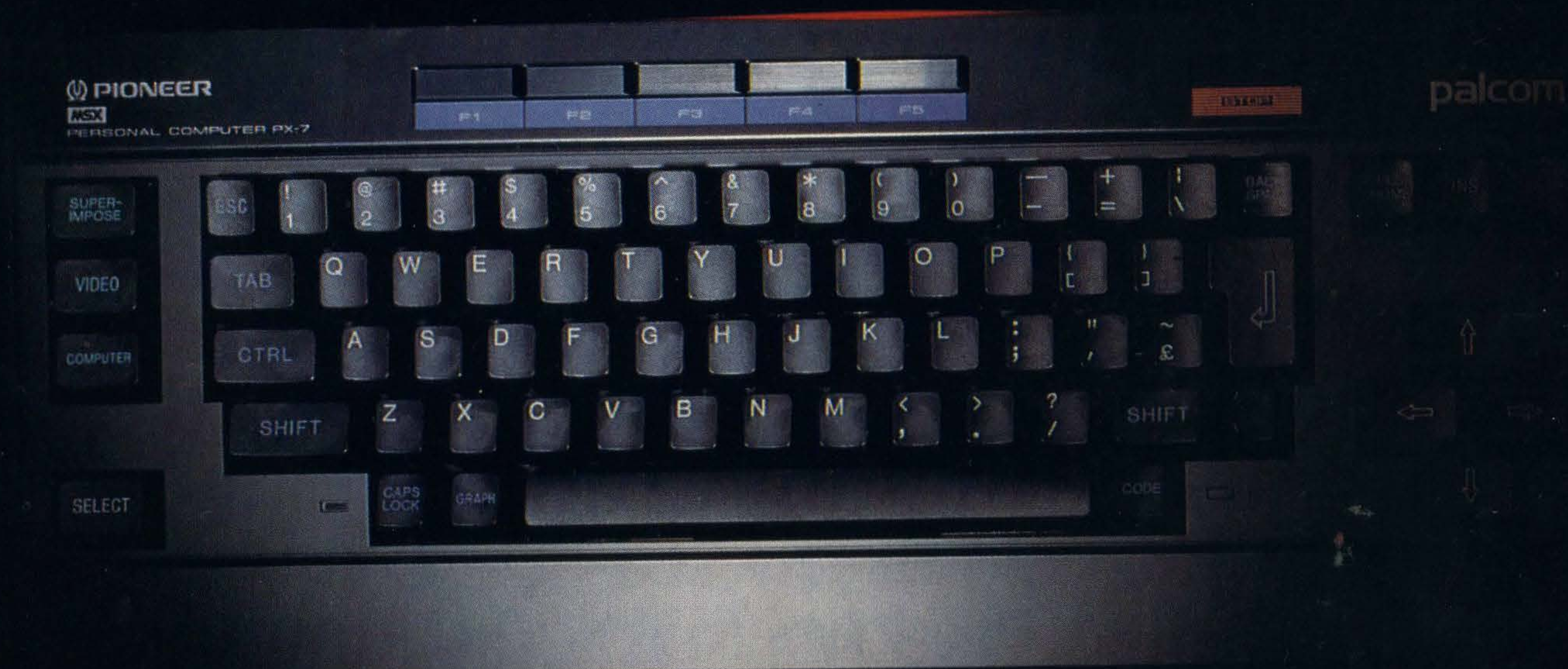
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VISUAL CONTROL

PIONEER PX-7 £300

You've heard about the MSX concept — where the micro is just the centre of a wide ranging system. Now it looks like it might actually happen, with Pioneer's new micro, the PX-7.

Pioneer isn't just offering a standard MSX computer, but a complete home entertainment system incorporating sound, vision and computer control.

For £300 you are not only getting a fully fledged personal computer that's brimming with potential but a specialised system with three very unique capabilities.

One is the function that permits superimposition of text and video images by means of Pioneer's own specialised video BASIC — P-BASIC. This supplements standard MSX BASIC which is also present.

The second capability is a built-in interface for a laser disc player, for creating and playing high quality interactive video games. And the third is a stereo sound generator.

The catch is that in order to make use of all these functions you're going to have to part with a lot more than £300, and buy a laser disc player, graphics tablet and a hi-fi — but more of that later.

> **The £300 Pioneer is not just a computer, it is also the centre of an exciting home entertainment system.**

What about the actual micro? And what makes it stand apart from all the rest? Well you only have to look at the PX-7 to see that it's in a class of its own. It comes in two units, a keyboard and a main computer unit which houses the CPU, P-BASIC, MSX BASIC and user memory.

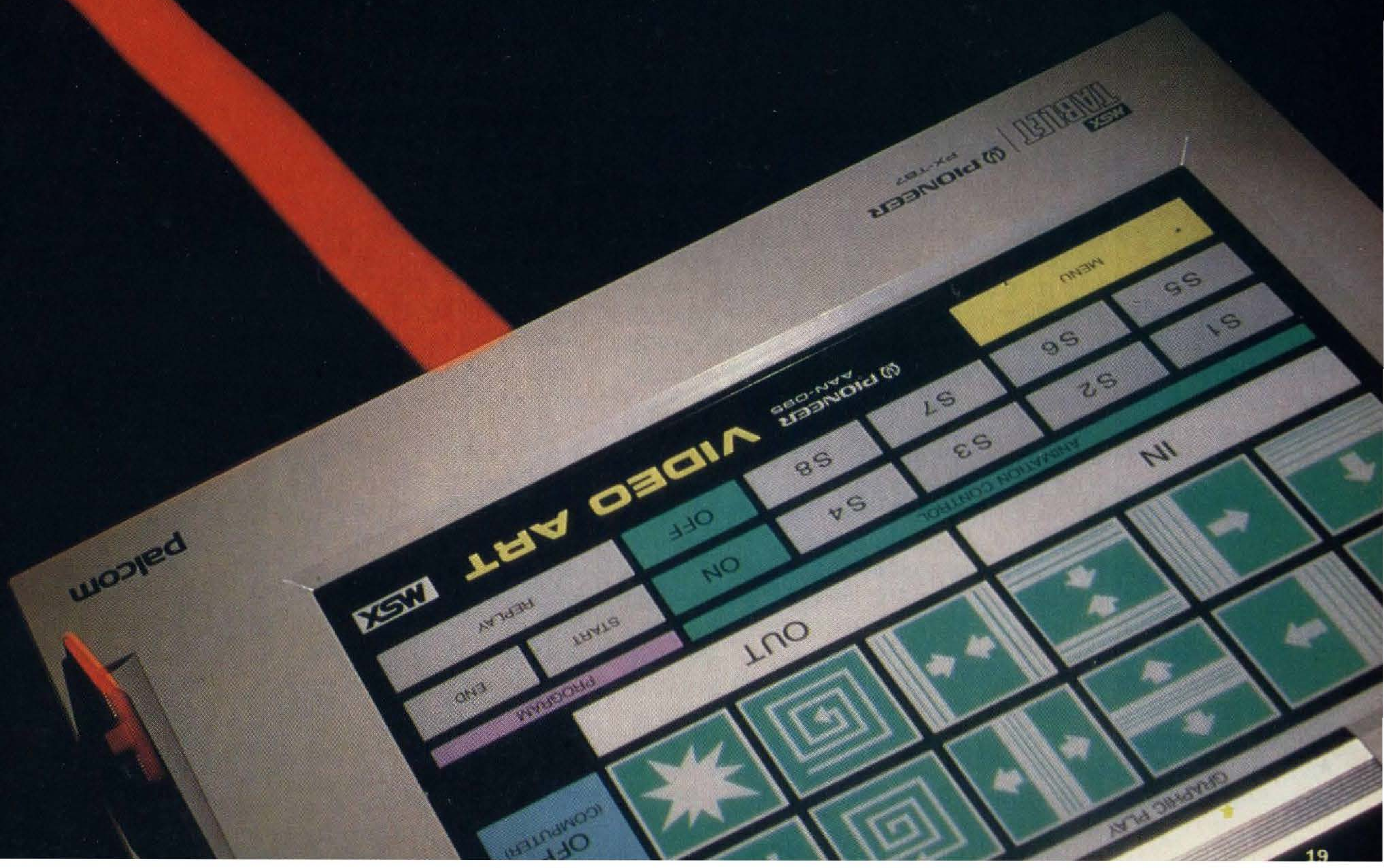
The keyboard is an enhanced version of the standard kind of MSX keyboard, and is attached to the main computer unit by a cable ending in a 13-pin DIN plug. It is housed in a matt black plastic casing and looks very sophisticated.

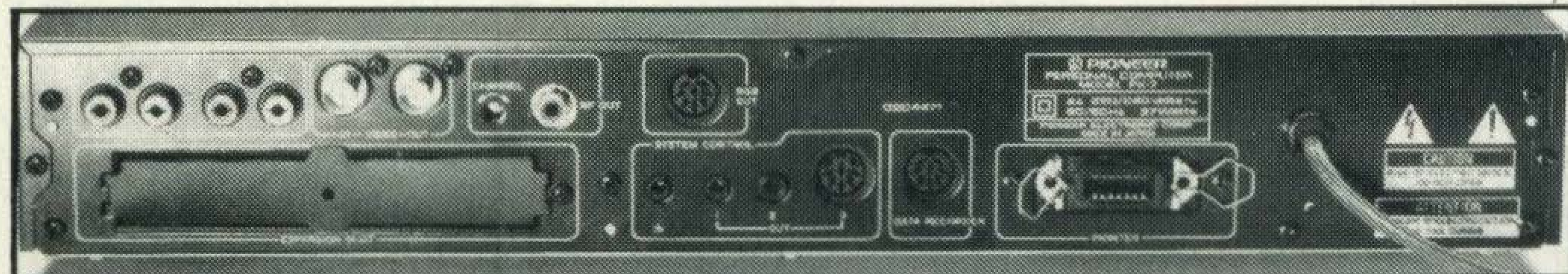
The function keys are laid across the top and the CLS/HOME, INS and DEL keys are on the right hand side, immediately above the four cursor control keys.

The colouring of the key symbols is subtle, giving a very neat and professional appearance. The function numbers are set into violet strips, and many of the other key symbols use a similar mode. Most of the letters and numbers, however, are in white, while the keys themselves are black.

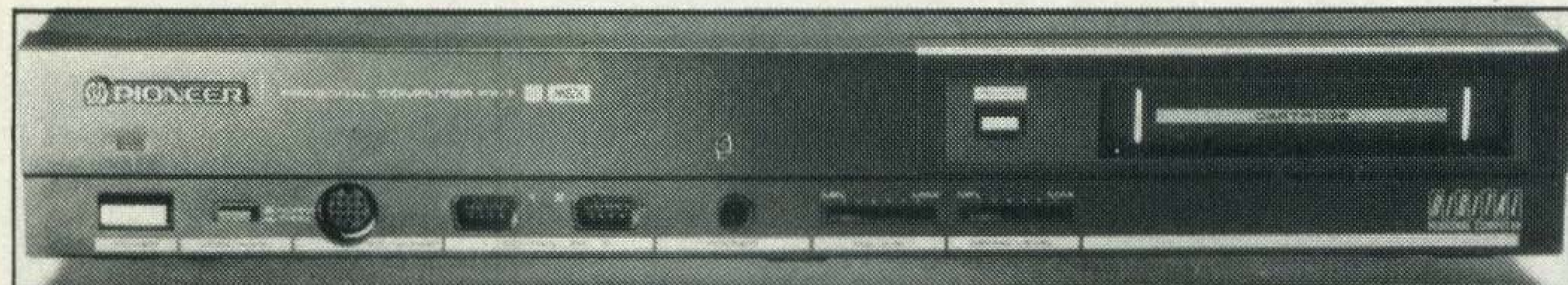
Apart from the colour and hi-tech appearance of the PX-7's keyboard, the only difference between this and the others is the presence of three extra function keys, immediately to the left of the ESC, TAB and CTRL keys. These three 'special' keys are for selecting SUPERIMPOSE, VIDEO or COMPUTER.

The keys themselves are reasonably firm to the touch and are of the kind of quality normally associated with expensive business machines, like the IBM PC. We were very impressed with the keyboard. It not only looks very professional but *is* very professional, and ideal for word processing or keying in lots of data.

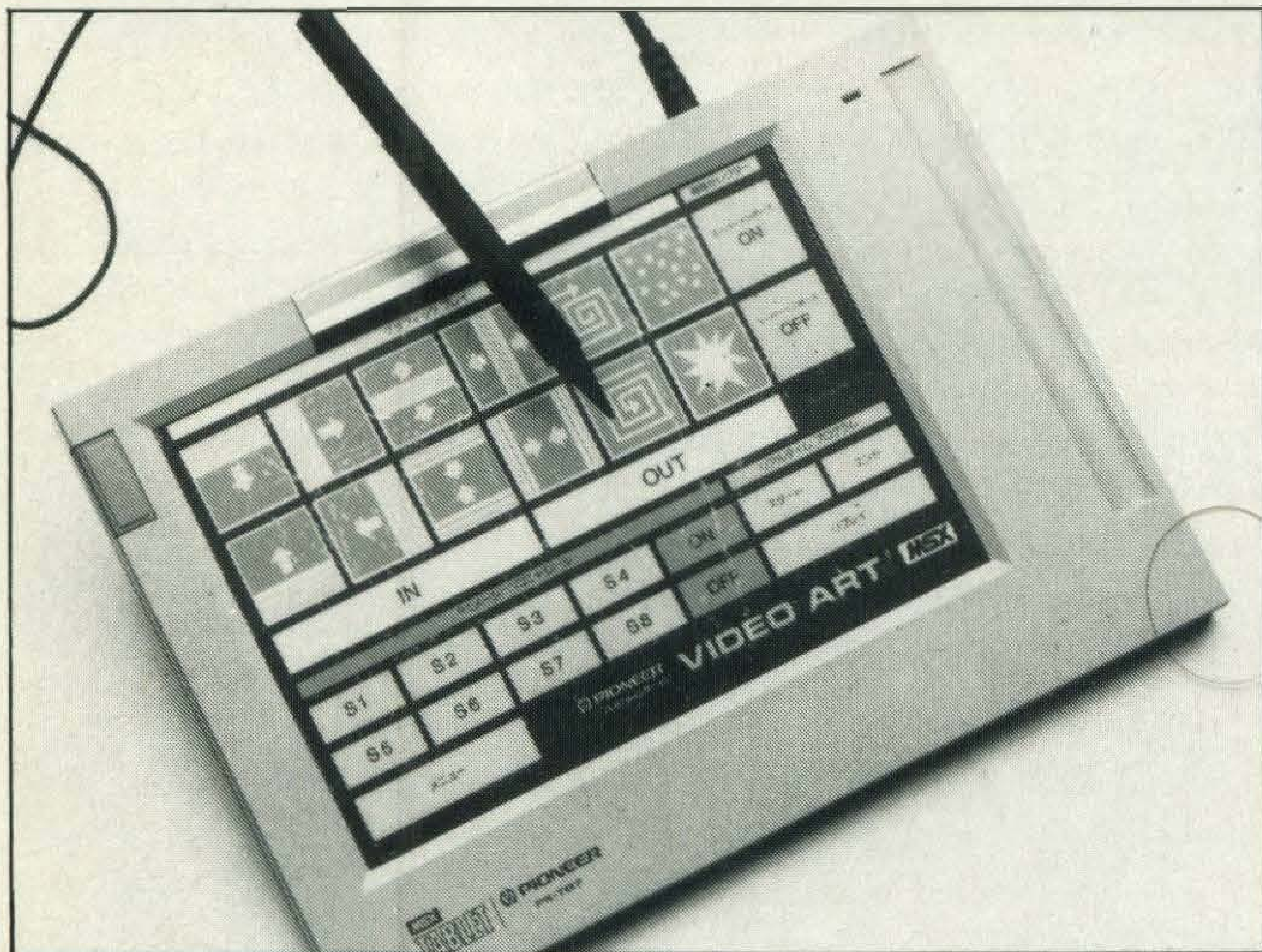




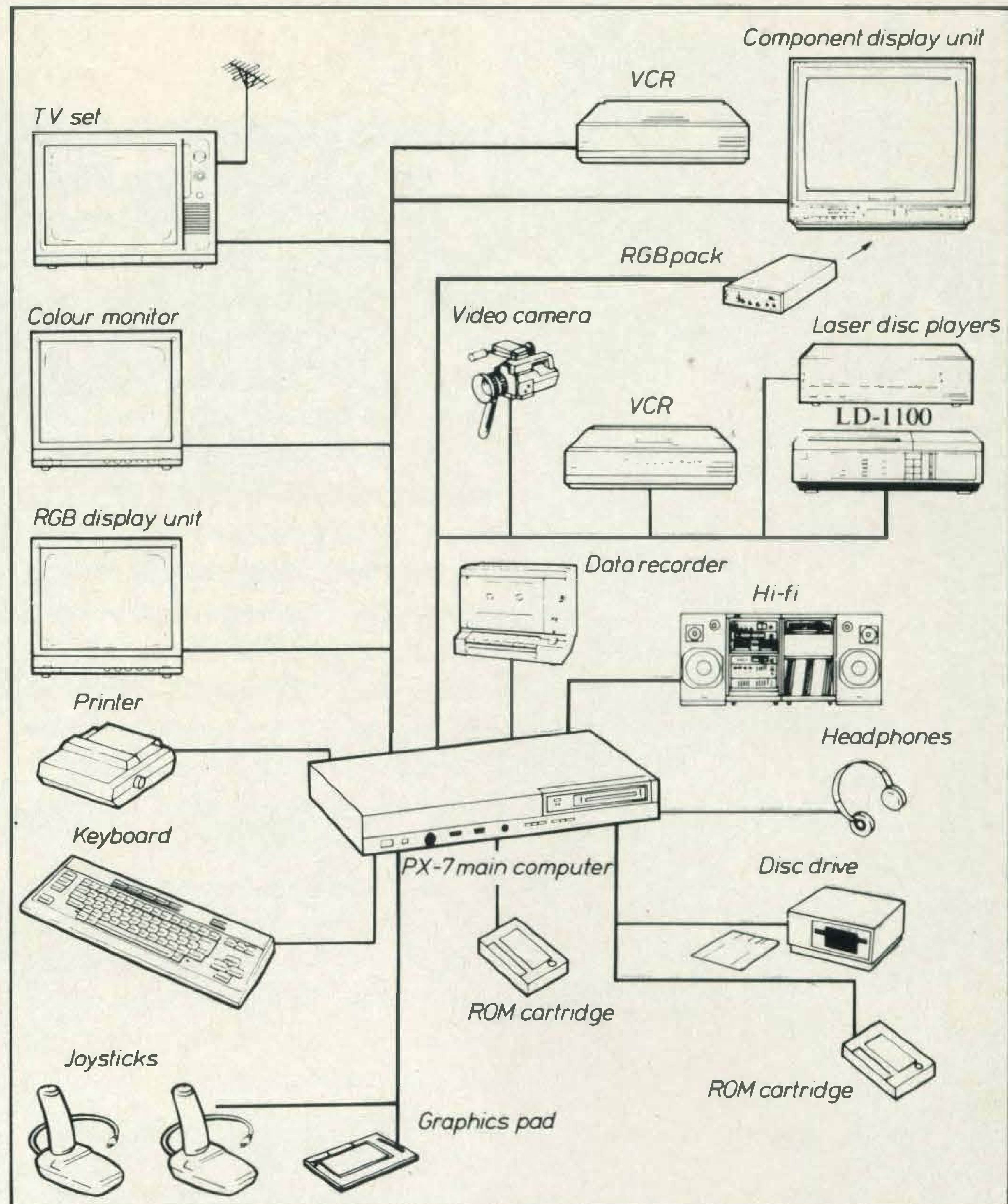
Pioneer's CPU has an abundance of interfaces



The CPU features a red reset and video/audio switches



Create and animate graphics with Pioneer's £90 Video Art Tablet



The computer is part of a wide-ranging home entertainment system

And as the keyboard is separate from the main unit you can easily lounge back comfortably in an armchair and type.

Another plus is that if you're games playing you can detach the keyboard altogether and just use joysticks plugged directly into the CPU unit.

The main computer unit is protected in a black metal casing and is littered with interfaces and controls on both the front and rear panels.

Again, as the base unit is separate it can easily be installed in an audio rack or on top of a video/laser disc player.

On the front panel, ranging from left to right, are: a power indicator and ON/OFF switch; the keyboard connector; a video/audio switch; two joystick ports; headphone socket; sliding volume and mixing controls; reset button; and a cartridge slot with a protective hinged flap.

On either side of the unit are speakers (for use in conjunction with interactive video units) and on the top is a ventilation grille to allow air to circulate freely and minimize the heat build-up produced during prolonged use.

Moving over to the rear panel, there's an abundance of facilities. There are interfaces for audio input/output (stereo), video input/output, channel adjustment, RF and RGB outputs, system control connectors for laser disc players, a cassette/data recorder connector, a second cartridge port with a pull-off protective cover and a parallel printer connector.

'The PX-7 is just a nucleus — it is up to you to expand the system to meet your own requirements'

The base unit as a whole is made of a black metal casing but the front and rear panels are of black plastic with a silver Pioneer logo. As the unit is separate from the keyboard it can easily be installed in an audio rack, or on top of a video disc player.

Like the keyboard the base unit is well designed with a high-tech finish looking remarkably like an audio amplifier. And we liked the position of the joystick ports in easy reach on the front — it's a pity other manufacturers don't put their ports in such a sensible position.

Surprisingly, the PX-7 is not a 64K machine. It has 32K RAM plus 16K video RAM, and 40K ROM (8K of P-BASIC and 32K of MSX BASIC). But don't get alarmed — when you're using BASIC the PX-7 still has 28K of user RAM available just like a standard 64K machine.

The only time you're likely to notice the lack of memory is when you try to write or use a machine code program that's more than 32K, other than that it won't hamper your computing activities. But if it does Pioneer is also launching a 32K RAM pack. By slotting this into the back of the PX-7 (into the expansion slot) you can write or run any 64K software.

As we said before, Pioneer's micro is the first MSX computer on the market to have its own specialised BASIC. It isn't different to MSX BASIC, it just extends its facilities and provides more power so that you can control the PX-7's superimpose, system control and stereo control functions.

In order to use P-BASIC all you have to do is wait for the screen to appear with the two options, MSX BASIC and P-BASIC, and select the one you require. And to use the extended P-BASIC statements just simply place the keyword CALL before the statement to be used. All this is explained in the manual and you should have little difficulty.

Of course P-BASIC isn't going to be of much use if you're just going to use the PX-7 for playing games and writing standard programs.

Pioneer's new baby is a complete home leisure system. The only way to exploit the full potential of the machine is to dig deep into your pocket and buy some of the extra peripherals like a laser disc player, a floppy disk drive or a hi-fi.

The PX-7 is just the nucleus — it is up to you to expand the system to meet your own requirements.

For example you could start off by buying a laser disc player (Pioneer's LD-700 laser disc unit will set you back around £500). Laser discs have great potential for both interactive education and video games.

Not only do they offer realistic video images and audio reproduction, but the actual discs are capable of storing vast amounts of information and providing quick random access to any part.

In Japan, laser discs are already a big hit in home entertainment because by using them you can fast forward, freeze, slow down, reverse or call up a particular frame all via the computer.

And that's not all. By using the graphics that you've cre-

LIKES

P-BASIC
Sophisticated add-ons
Stylish design
Separate keyboard

ated you can superimpose them over a sequence of frames from the disc or you can superimpose your own titles on the screen.

Unfortunately laser disc software hasn't arrived here yet. But you can have just as much fun with a graphics tablet. Pioneer calls its model the Video Art Tablet. It costs £90, and comes with cartridge-based control software.

We borrowed one of these with the PX-7 and had great fun experimenting with it. The device consists of a flat pad and a touch pen. In fact, it's very similar to British Micro's Grafpad.

Animation

The tablet is a very versatile peripheral. It provides you with all the standard picture drawing facilities we're used to from devices like the Sony lightpen. These include straight lines, circles, erase, change colour and change background colour. And you can fill a shape in a different colour — a facility that's not included with the lightpen.

The whole product is very simple to use. You just pick out the colours and shapes you require on the pad and draw.

There is also an animation mode. This allows you to describe by moving the pen on the graphics tablet the way you'd like the graphics you've just created to move around the screen. You can make a test run to make sure that it's okay, then save or superimpose it on laser disc based footage.

A maximum of eight sprites can be animated in this way. We drew butterflies and dogs and had great fun watching them flutter and hop across the screen.

As an ordinary MSX computer, the PX-7 is very impressive and is definitely much more up market than a Goldstar, Sanyo or Sony, but then it's aimed at a different market. Just as the Yamaha is aimed primarily at the budding musician, the Pioneer is aimed first and foremost at the consumer whose main interest is in home entertainment, particularly video. You don't have to be a computer freak to buy and enjoy a PX-7.

Pioneer really has done the MSX concept proud. Not only has it produced a high quality micro but a range of equally sophisticated accessories that add up to a fully integrated entertainment system.

We recall that, at the launch of MSX, most of the manufacturers claimed that they were working towards such a system. But to date only Pioneer has made those claims a reality. It remains to be seen whether the rest will follow suit.

Verdict

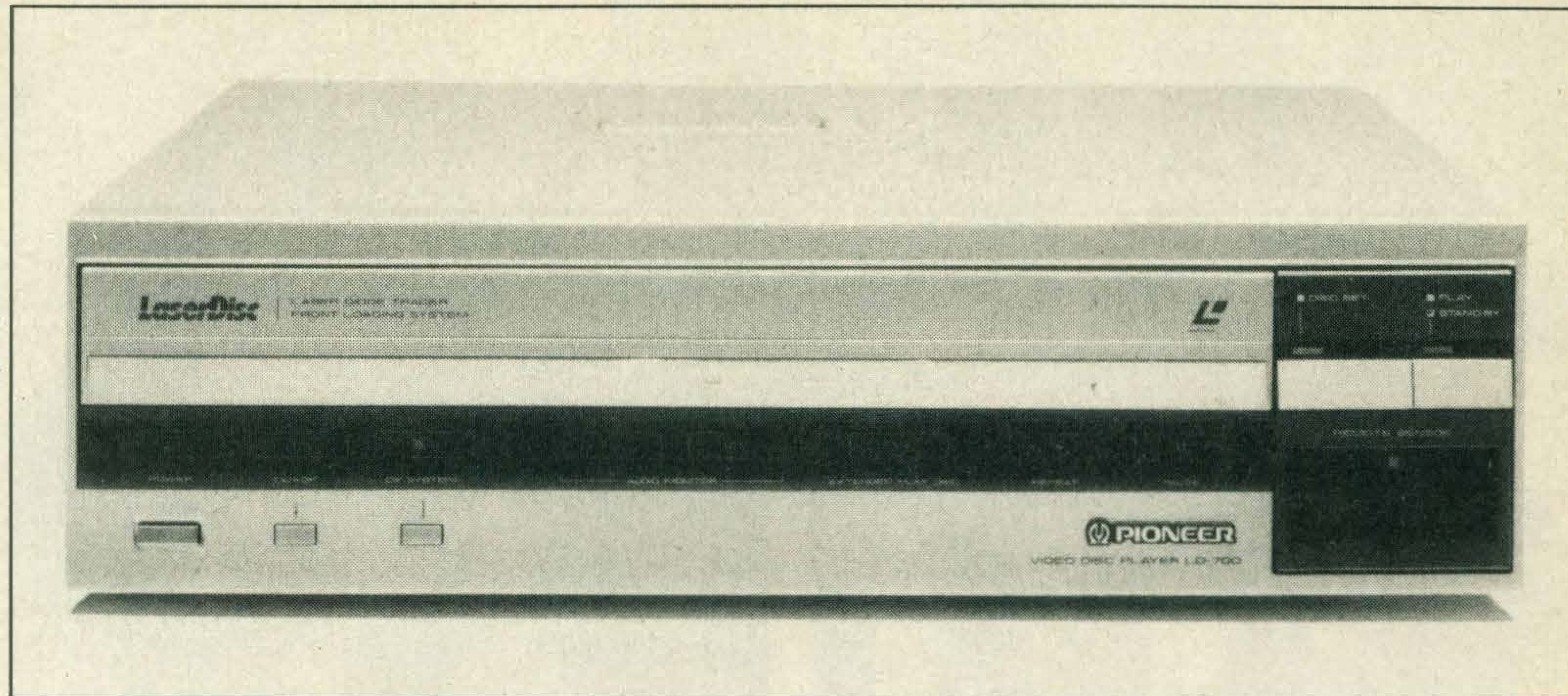
Pioneer plans to release the PX-7 early in September so if you're on the verge of buying an MSX take a tip from us — nip down to your local dealer and take a good look.

At £300 it isn't cheap, particularly when many of the other MSX models are being sold with substantial price reductions.

But we reckon that the PX-7 is in a league of its own. There is no other machine currently on the market to match its versatility and expandability. The PX-7 is what MSX is all about, and it has been well worth the wait.

DISLIKES

Limitations of 32K
Price



Laser or video discs hold great potential for interactive entertainment. This unit will cost you around £500

PIONEER PX-7 £300

SPECIFICATIONS



CPU	8-bit Z80A (3.58 MHz clock)
MEMORY	
RAM	32K
ROM	40K (32 MSX BASIC, 8K P-BASIC)
VIDEO RAM	16K
KEYBOARD	
TYPE	Full travel
KEYS	48 Alphanumeric 28 control keys keypad cursor control
VIDEO DISPLAY	
TEXT	Screen 0: 40×24 Screen 1: 32×24
GRAPHICS	Maximum resolution 256×192 pixels
COLOURS	16
SPRITES	256
OUTPUT	PAL, RGB, TV
SOUND	
GENERATOR	3 channels with 8 octave range
OUTPUTS	Internal speakers (stereo) Headphones (stereo) Line output (stereo) 150mV/10kOhm
INTERFACES	
JOYSTICKS	2 ports
CARTRIDGE PORTS	2
PRINTER	1 × Centronics
CASSETTE	8-pin DIN
RESET	Yes
DIMENSIONS	
KEYBOARD	420×171×47.5mm
COMPUTER MAIN UNIT	420×323.5×79mm (W×D×H)
WEIGHT	
KEYBOARD	980g
COMPUTER MAIN UNIT	4.4Kg
POWER SUPPLY	Internal, captive mains lead
FINISH	Black plastic casing
SOFTWARE INCLUDED	None
SUPPLIED ACCESSORIES	RF cable Instruction manual BASIC reference manual P-BASIC manual
DISTRIBUTOR	Pioneer High Fidelity 116 Field Way, Greenford Middlesex UB6 8U2
ACCESSORIES	LD-700 laser disk player £500 PXJY8 joystick £10 PXTB7 graphics tablet £90 PX-RA32D RAM pack £50

TAKE YOUR PICK



Whether it's music, art, business or video games, MSX has the answer

Oh yes, having a computer's all very well, but what do you actually *do* with it? We've all heard that cry from people who, instead of being computer literate are simply computer puzzled.

But it's still a good question, and one that's easier to answer with MSX micros than any other system. That's because MSX computers don't just sit there and hum, nor do they just play superb games (although they can do that, of course).

Elsewhere in this issue you can read about plans for MSX micros to control microwave ovens and central heating systems. But even though those applications are still some way off, there are plenty of useful things you can do with your computer now. So let's look at some of the hardware and software packages that can turn your micro into a musical instrument, artist's canvas or business tool.

We'll start with the business area, because that is, perhaps, of interest to most people. Almost everyone can make use of a word processor, or database program.

In fact, comparatively little decent business software has come our way so far. This could have a lot to do with the scarcity of disk drives. At the time of writing, only one drive, the Sony, is freely available, and that's at a rather high price.

Business programs, or the files they use, really need to be on disk, as you're often swapping between files and programs. One company, Computermates, has solved this problem by putting all of its programs on cartridge.

One of the advantages of this is that the programs run instantly. For the files, however, both disks or cassettes can be used depending on what you have at the time (you can even swap files between the two).

The company makes a wide range of sensible software, with all the titles built around a common format. So if you've used one you can easily use the others.

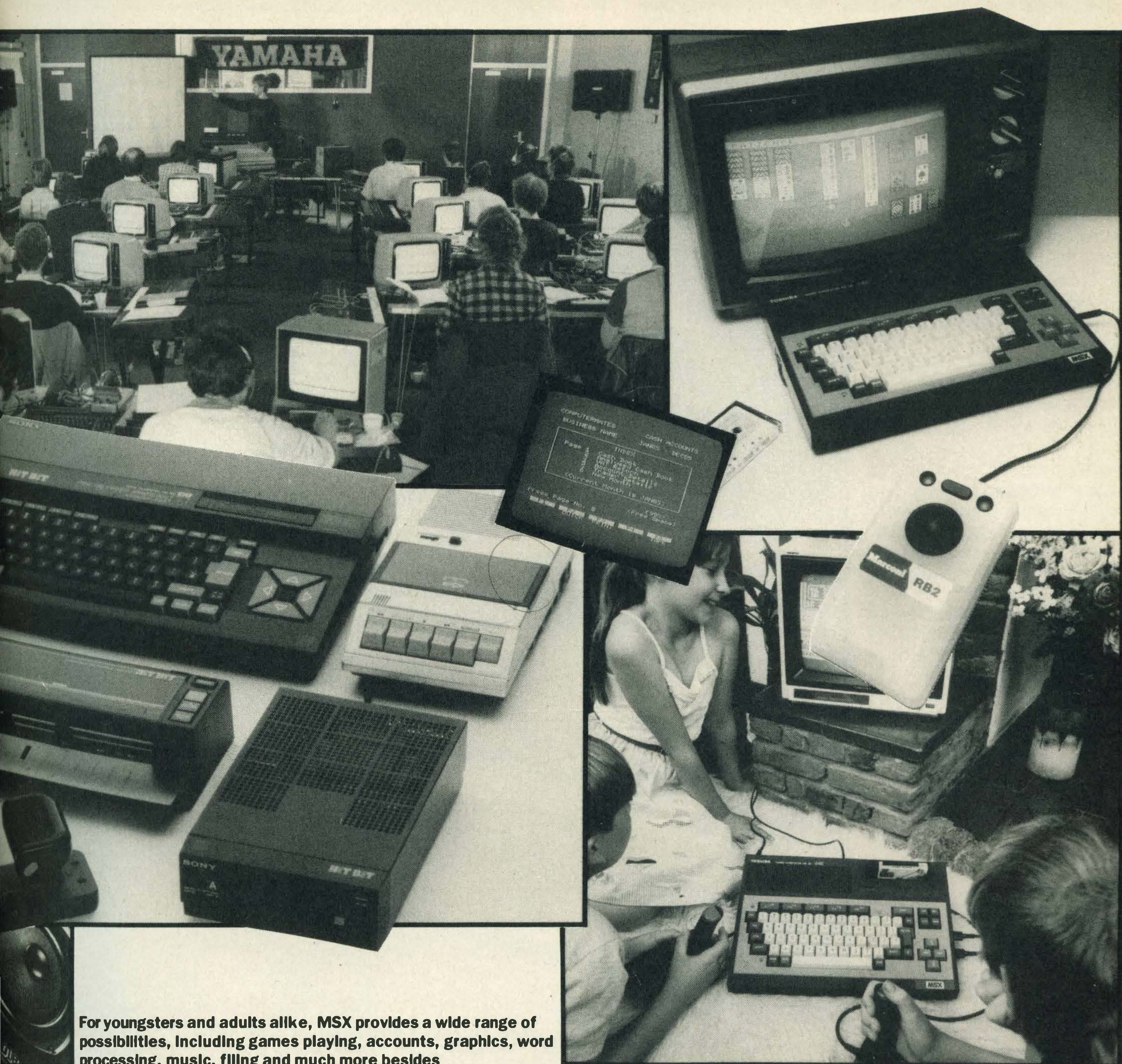
Computermates has also adopted a kind of modular approach to its software, where programs, available separately, are also combined into packages. For example, the *Word Processor* and *Cards* database programs have been put together to form *Mailshot*. With this, text from the word processor can be appended to names and addresses contained in the database.

The *Cards* program is particularly good, due to its free-form text and rapid search facility. With the word processor it could easily form the heart of any business outfit.

However, there is one more package containing both these programs, and that's *Comms Plus*. This has the added facility of sophisticated communications software (for linking up with other computers) and an RS232C serial port built into the cartridge.

At around £200 it's not the cheapest piece of software around, but it does represent excellent value for money, especially as new versions will contain full colour graphics for use with viewdata systems like Prestel.

Other titles from Computermates worth adding to your business collection are *Spreadsheet* and *Cash Accounts*. These individual programs cost around £40 each, so setting up a business system isn't going to be cheap.



For youngsters and adults alike, MSX provides a wide range of possibilities, including games playing, accounts, graphics, word processing, music, filing and much more besides

But there's a lot to be said for getting all your software from one supplier — using the computer is much easier if all the programs work in the same way.

If that's not so important to you, it's worth looking at the Kuma spreadsheet, although it's only available on cassette at the moment. Hopefully a disk version will become available at a later date.

One program already on disk is *Aackotext* — undoubtedly one of the best MSX word processors around. Although the Computermates program is ideal for short pieces of text such as memos, and superb as a text editor for the *Mailshot* and communications packages, it's not as good as *Aackotext* for longer pieces. Again, you'll have to fork out around £40 for the program, but it's worth it if you write long letters, reports or medium size articles.

The chances are that if you're using a word processor, spreadsheet, or similar type of program, you're going to spend long periods of time staring at characters on the screen.

To stop yourself looking like some kind of blind bug-eyed monster, think carefully about getting a monitor. Elsewhere in this magazine some advice on choosing monitors is given. But, in brief, for business use, an amber or green screen monochrome monitor is best.

The Philips' models are ideal as they have a facility to move the screen image sideways. This stops you losing the first character of each line which can occasionally happen with MSX micros and some monitors or TVs.

One particularly useful monitor is the new Philips CM8524. This is a colour version, with simple phono inputs for sound and vision — exactly the same as the composite video outputs on most MSX micros.

It also has RGB inputs, although, if you have a micro with RGB output you'll have to check that it's a compatible signal. Switching between RGB and composite modes is a simple matter of pressing a button.

Another button converts the colour CM8524 to a green screen monochrome monitor — equally useful for business applications and games. At around £265 it's a good all-purpose VDU, although if you eventually use a micro with an 80 column screen (which the next generation of MSX machines should have) you're going to need something with higher resolution.

Believe it or not, you'll also need a computer. At first sight there might seem to be little to choose between the current models, but that's not quite true.

If you're going to be doing a lot of word processing, you'll need a micro with a good

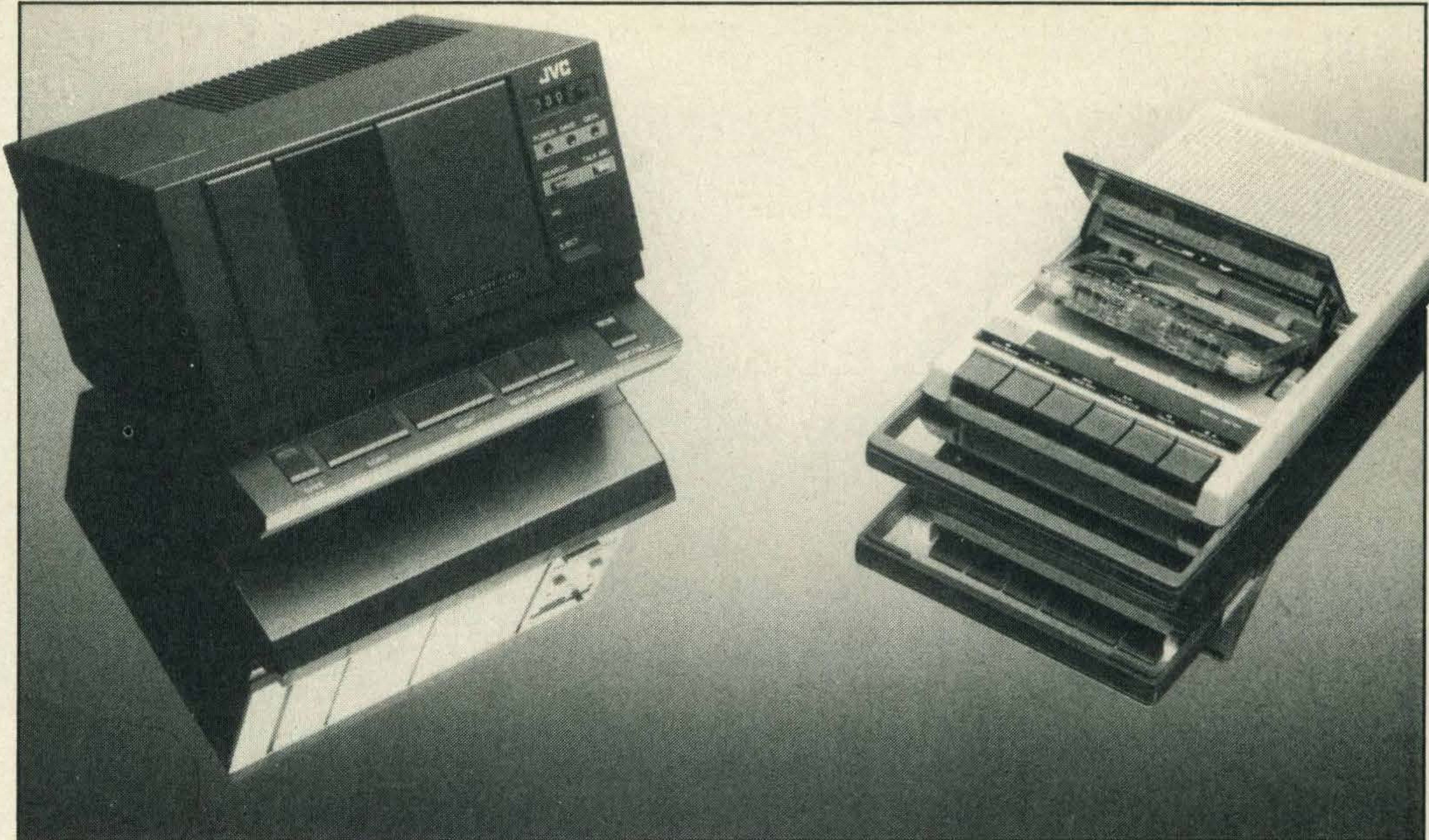
quality keyboard. The Mitsubishi, JVC and Sony models spring to mind. But if you're into number crunching, perhaps with a spreadsheet, then the Spectravideo SVI-728's numerical keypad will come in extremely handy.

As far as imminent machines are concerned, the sleek Toshiba HX-22 has a built-in word processing program, saving you the trouble of buying one. And Spectravideo's X'Press has a built-in disk drive — an even bigger bonus.

Although a disk drive is almost essential for business work, a printer is an even bigger must. It's no good having reams of figures for your accountant, or a Pulitzer Prize-winning article for your friendly neighbourhood editor, if they have to trek round to your house to see them.

Naturally, an MSX-compatible printer is ideal, as it allows you to use all those lovely graphics characters. But for practically all business applications a standard daisy wheel or dot matrix printer is fine — the former for neat letters and manuscripts, the latter for virtually everything — but at a slightly reduced quality.

So the whole business package includes the micro, a monochrome monitor, printer, software and, preferably, a disk drive. If you can't afford the disk unit, then you'll need a data recorder. You should be able to collect the set for well under £1000, which is pretty reasonable in business terms.



Data recorders come in all shapes and sizes. Here's JVC's at £89 and Sanyo's at £30



A printer is essential for business users — here's Canon's F-60 thermal dot matrix model

'On a lighter note MSX micros are just as good at handling tunes as they are at handling your bank balance'

On a rather lighter note, MSX micros are just as good at handling tunes as they are at handling your bank balance. That's been obvious right from the beginning with the inclusion of Yamaha's 32K CX5M amongst the first machines.

The Yamaha is being sold mainly as a music micro, complete with a choice of instrument keyboards, and a built-in MIDI interface.

The latter is important. Some time ago Yahama was one of a group of companies that laid down a standard for electronic interfaces between musical instruments.

The result was MIDI (Musical Instrument Digital Interface) and theoretically, any MIDI equipped instrument can be linked to any other. That's useful if you want to link up drum synthesizers, keyboards, sequencers and so on. It's irrelevant if you only ever use the keyboard on its own.

However, the Yamaha has other tricks up its sleeve. One is stereo output for feeding the music through an amplifier. And there's the facility to link the machine to Yamaha's DX-7 professional synthesizer, to simplify its programming — with the appropriate software, of course.

As well as a program to control the DX-7, Yamaha also produces rather nifty voice programming and composing software packs. And they're all on cartridge to make life easier.

The sound of the CX5M is produced by an FM synthesizer unit, unique to Yamaha. This gives an almost unlimited variety of crystal clear sounds, and is what has made the company's professional electronic instruments so successful.

You won't get that on any other micro, but you can add a MIDI interface to standard MSX computers. Electromusic Research (EMR) is a company which produces MIDI interfaces for a range of home computers, MSX micros being the latest in the line.

Along with the interface the company also produces software modules to allow a wide range of musical manipulation. Facilities include real time digital recording, composing (the musical equivalent of a word processor), sheet music printout and editing of compositions.

MIDI

The software modules should cost between £15 and £50, with the interface itself costing about £90. You then have to plug a MIDI compatible keyboard into your computer. So the whole package doesn't come cheap, but it is a very sophisticated tool for the dedicated electronic musician.



Sanyo has developed a range of add-ons including monitors, joysticks and light pens



More disk drives are appearing for MSX users



Aakotext — one of the best MSX word processors

For those who prefer to dabble, at rather less expense, Rittor Music produces a couple of interesting programs which exploit the micro's own sound chip.

Musiwriter comes in cartridge form, and its main purpose is to allow you to write and edit music, including chords (something that's rather difficult with the Yamaha software.)

The notes appear on the screen, arranged on the familiar stave which can be scrolled backwards and forwards. The music can be played back at any time, saved to tape or printed out.

Odyssey-K, which is cassette based, actually turns the computer into a keyboard — albeit a fairly primitive one — and allows simple composing with a RECord mode. You play the tune and the computer plays it back to you.

These two programs are more useful for learning about music than playing it. And you could usefully employ them to teach it too. For really serious musical endeavours, the EMR package or the Yamaha micro are preferable.

Should your talents lie in the visual, rather than the audible arts, you're also well provided for with MSX. You won't find anything yet that can compete with professional computer graphics systems (in the way that MSX music packages can compete with professional systems). But there are plenty of products to make designing easy and enjoyable.

The first of these to appear was the Sanyo lightpen, and it's still one of the easiest to use. The pen itself contains a light sensor and, with the relevant software (supplied on cartridge) can work out where on the screen the pen is being held.

The software also contains a full range of drawing utilities, including different line thicknesses, fill routines, circle and rectangle drawing as well as the ability to save pictures to tape for later reloading.

British Micro's Grafpad comes with similar, if simpler, software, this time on tape. The Grafpad is a graphics tablet — a kind of electronic doodle pad which you draw on with a stylus, itself connected to the pad.

Pioneer has adopted a similar approach with a tablet for its PX-7 micro. In fact, it's part of the complete video package, and the tablet is intended mainly for controlling video and computer graphics images. But with suitable software (available on cartridge) it can be used as an all-purpose graphics designer, with the added bonus of being able to design sprites and then animate them, cartoon-fashion.

'The Tracker Ball takes a lot of beating, particularly when it comes to quality of manufacture'

A more unusual graphics device is the Marconi tracker ball. As it sounds, this features a free moving ball set into a panel. Rolling the ball moves the cursor around on screen.

It's not only simple, it's actually fun to use. It will work as a highly sophisticated joystick (Konami's *Tennis* is especially good with it) or can be used with the supplied software like the other graphics systems.

What you actually intend to do with these devices determines which is most suitable for you. If, for example, your interest is in video production, then the Pioneer will be an obvious choice. But for just drawing pictures, the tracker ball takes a lot of beating, particularly when it comes to the quality of manufacture.

A printer, especially a colour one, might seem to be an essential peripheral for graphics work. However, printers are not usually fully supported by the software, so you might have to write your own programs to obtain full colour screen dumps.

But one peripheral you will need is a monitor — preferably a good quality colour one. The Philips model mentioned earlier is ideal.

That should give you some idea of how an MSX micro can be put to good use — and how it can empty your wallet. But remember that this is only the start. Peripherals and software packages are appearing all the time, and as MSX is designed to be versatile, new uses will be found. ■


TOSHIBA
HX-22
MSX
STOP
SELECT
RETURN
SHIFT

WRITE ON

TOSHIBA HX-22 £TBA

Toshiba's new micro includes some interesting added extras — but will it offer you value for money?

While you are waiting for MSX II, how about MSX 1.5? The Toshiba HX-10, one of the most popular MSX machines, has now been joined by an upgraded stablemate, the HX-22.

Unlike some other MSX computers, the HX-22 does not come with a built-in interface for your video recorder, hi-fi, microwave oven or tumble drier. Its enhancements are aimed squarely at computer enthusiasts, and are achieved without affecting hardware or software compatibility with other MSX products.

Externally it looks like any other MSX machine, with a new black case. But a look at the I/O ports, which connect the micro to various peripherals, reveals some improvements to the basic specification. Immediately obvious are the twin cartridge ports, compared to the single slot (supplemented by an expansion bus) on the HX-10.

Another long-overdue addition is an RS-232 serial interface, supplied as standard. This uses an IBM-standard 25-pin D plug/socket combination, unlike the Centronics-type parallel interface which goes on using the odd (but MSX-standard) connector, used by absolutely nobody else worth mentioning.

Conventional jack connectors are provided to link up the RF (television) output, audio and composite video. RGB is a new addition via one of those expensive European SCART connectors. Around the side are the usual two joystick 9-pin D connectors and the cassette interface.

Finding out exactly what the HX-22 will and won't do was slightly hampered by the total absence of documentation supplied with the pre-production (but definitive) review machine.

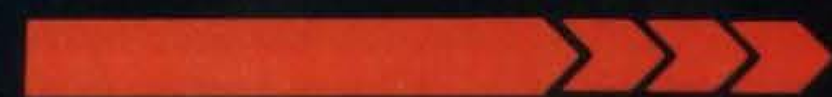
Undaunted, and armed only with a screwdriver, an inexhaustible supply of Haymarket coffee and our natural curiosity we fearlessly switched on. Surprise! You don't get the usual 'MSX v.1.0' message. Instead, you get a slight pause followed by a pretty colour picture of (presumably) downtown Tokyo at night. This serves no useful purpose whatsoever as far as the user is concerned, apart from filling up ROM space, but it might impress the neighbours.

The people who might benefit from the picture are the dealers. A computer with just the normal blue start-up screen looks pretty boring sitting in the shop window, and loading software (not to mention making sure it *stays* loaded) is a hassle. The cityscape on the HX-22 makes the computer a more attractive selling proposition.

The first time you prod a key, a little window opens up within this urban panorama, offering the choice of BASIC or a word processor. Just to get this out of the way, the BASIC supplied is absolutely standard MSX 1.0 and will not be mentioned again.

Selecting the word processor proves that the HX-22 is more than just a couple of extra I/O ports. In fact, it is stuffed with extra ROM, holding the serial communications software and the word processor without absorbing a lot of the valuable RAM.

An opening menu gives you eight numbered options — respectively, these are: writing (creating and editing) text; printing; loading from tape or disk; saving; clearing out the memory; setting what are quaintly called 'program variables'; serial communications and exiting to BASIC.



Selecting option 1 takes you into the editing screen, upon which you might recognize a strong resemblance to the Computermates word processor we reviewed earlier in the year. However, this is a greatly improved version, which includes most of the functions we criticised Computermates for not incorporating.

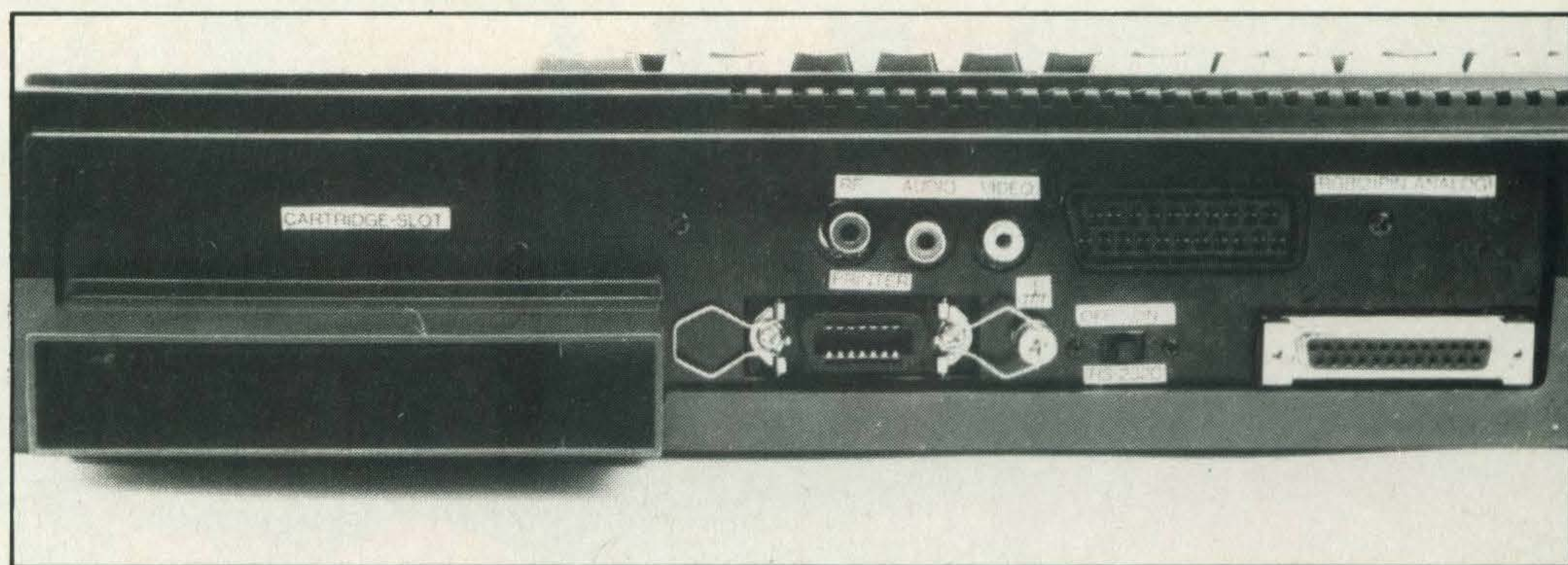
The free memory available for editing text is about 20K, or something in excess of 3000 words, which is displayed by a status line on the screen.

Also displayed are the functions carried out by the function keys. When you start

'The free memory available for editing text is something in excess of 3000 words'

editing, these are used to centre, indent, justify text or force a page break respectively. Hitting SELECT changes the reading of the status line and the meaning of the keys — F1 now marks the start of a designated text block, and F2 ends it.

Pressing SELECT once more redefines the keys again, giving you the block functions MOVE, COPY, DELETE and RESTORE. The last is a useful 'oops!' function, recalling the last block you deleted.



A pretty healthy array of interfaces on the HX22, including the RS232 on the right

Yet another depression of SELECT gives you FIND and REPLACE on F1 and F2. These work essentially the same way — you enter a string of characters to be searched, the program asks whether or not you want the case (upper or lower) to be ignored.

To repeat a FIND or REPLACE operation all you do is hit RETURN in response to a prompt: ESC quits the routine. One thing you can't do (we think — it's hard to be sure you've got everything without any documentation) is have the program replace *all* the occurrences of a string without asking you each time if you really mean it.

After you have finished with these functions, SELECT restores the function keys to their initial editing functions.

Navigating your way around the text is a little clumsy, as there are no short cuts. You can move the cursor one character

'Deleting text is another area where full-scale business word processors have more flexibility'

left or right at a time, or one line vertically. There is no way of jumping straight to the end or the beginning of the file, or down one paragraph, or moving one word at a time.

Deleting text is another area where full-scale business word processors have more flexibility. With this one, you can only delete one character at a time, backwards, using the backspace key. Forward deletion is not possible, nor is there a text overwrite option.

Although the feel of the keyboard is greatly improved over that of the HX-10, we found that it responded rather sluggishly, and tended to miss out characters once the user got up a good head of steam. This is a potentially serious flaw for self-taught typists who spend their time looking at the keyboard instead of the screen, but it is hard to say whether the problem lies in the hardware or the software.

When it comes to printing the text, you will first need to examine option 6 on the opening menu, Program Variables. This option lets you change the parameters for screen or printer output. Print parameters include number of lines per page, the margins left at the top, bottom and left of the paper, the line length, heading margin, line spacing, and on/off toggles for wordwrap and justification.

Parameters

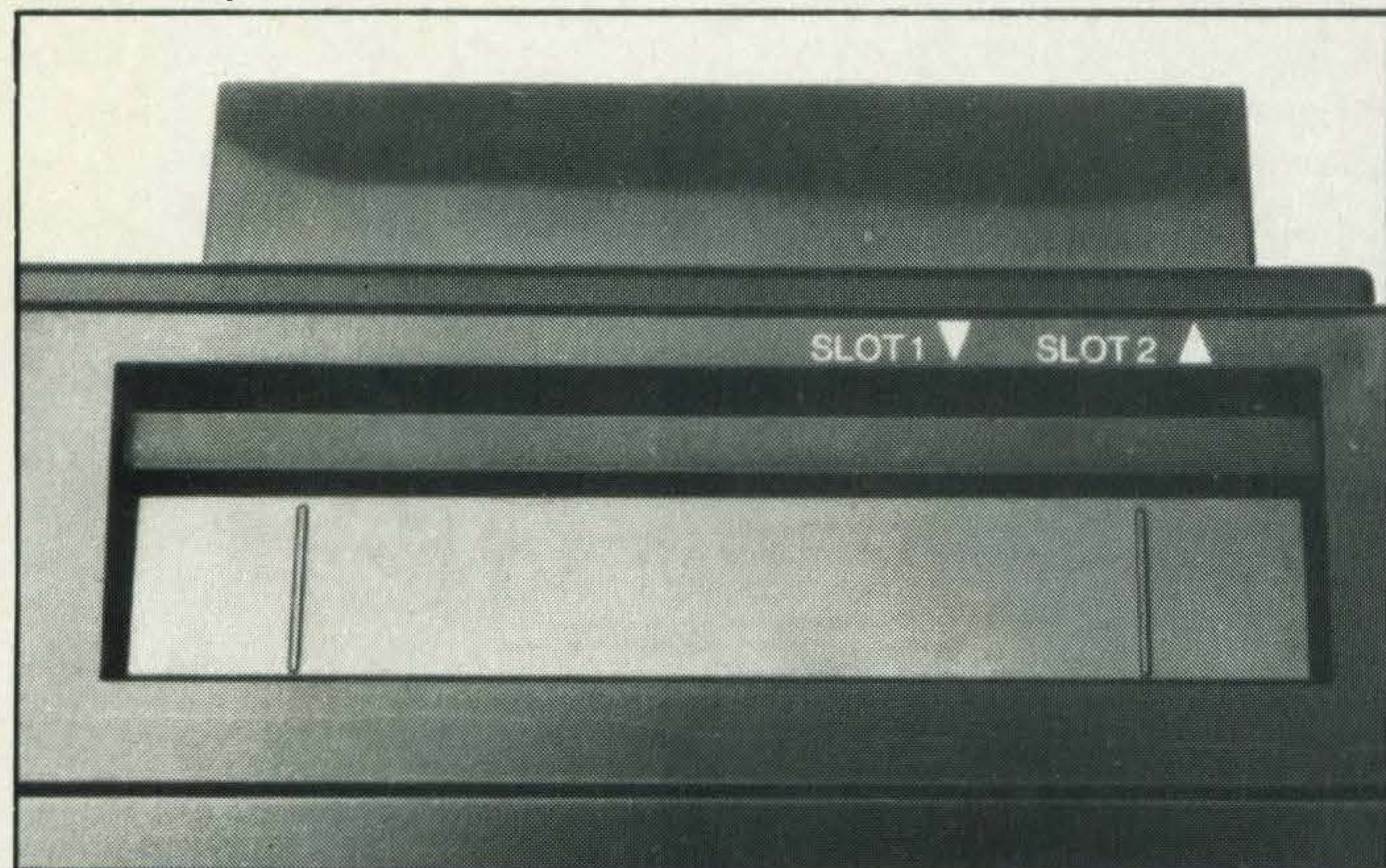
Of course, one of the drawbacks of editing on a 40-column display is that the printed results bear no relationship to what you get on the screen.

The screen parameters you can set include, very usefully, the length of the displayed line (39 or 37 characters). This gets round the problem experienced with some computer/TV combinations whereby the leftmost characters of the display disappear off the edge of the screen.

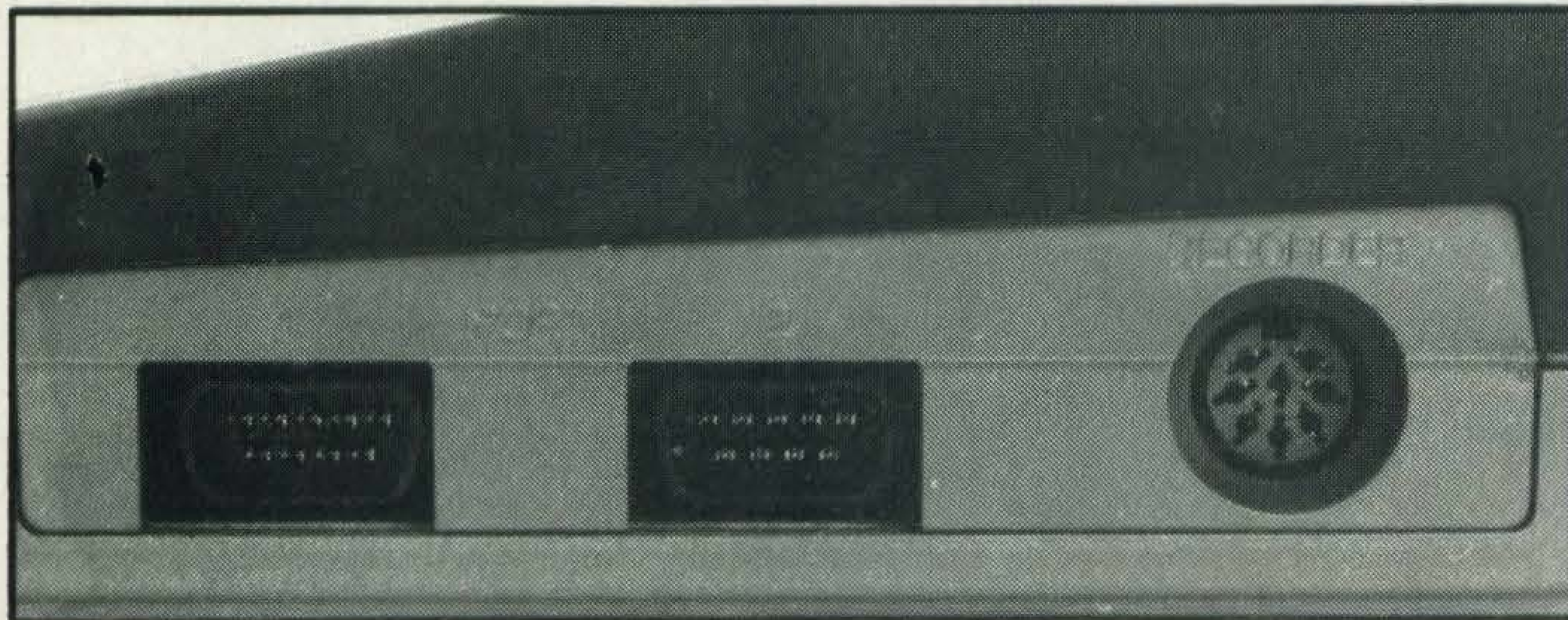
You can turn off the warning beeps and the echoed keyclick sound, though the keyboard's annoying tendency to miss out characters means you should really keep the keyclick turned on. Finally, the colour of the background can be changed.

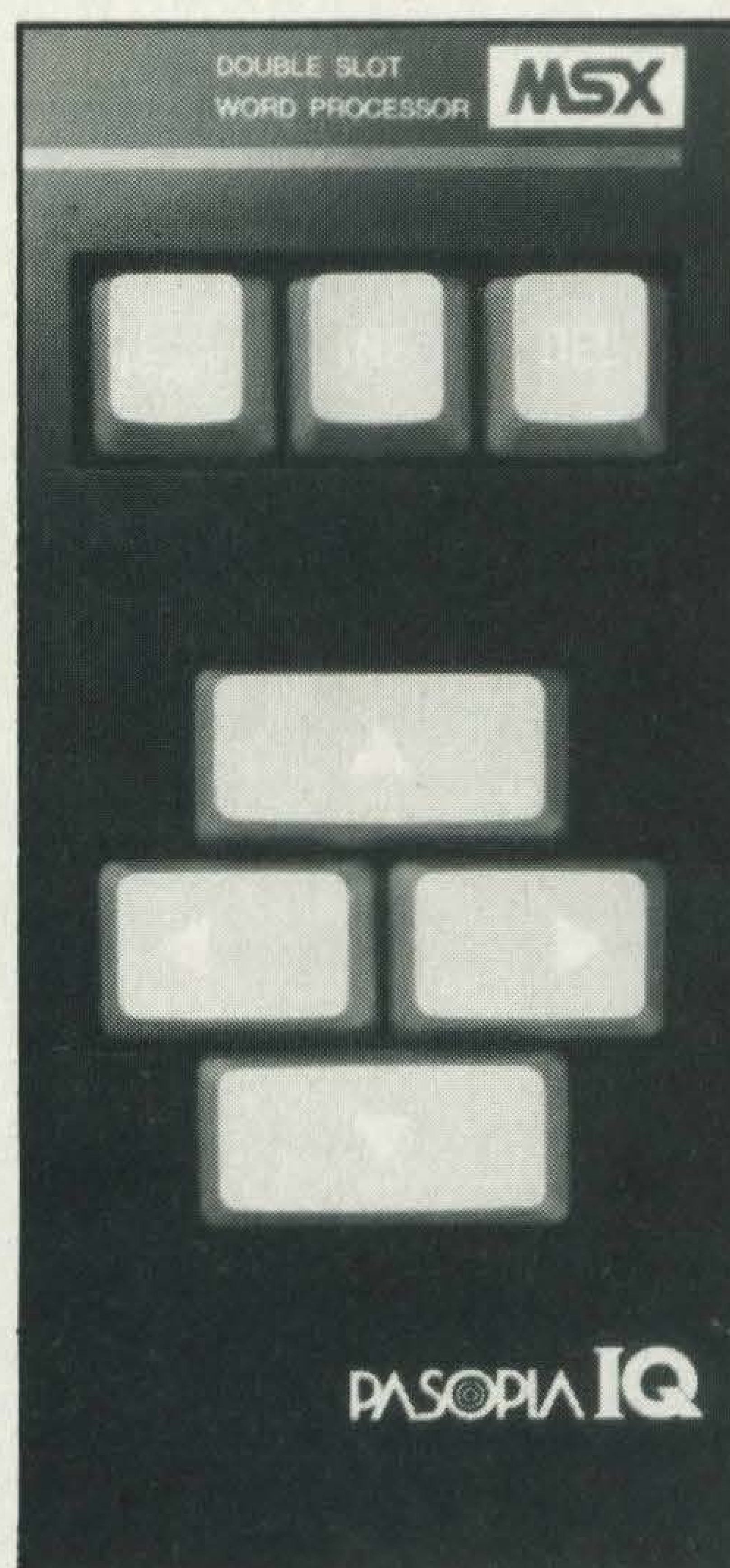
Once you have set up these variable parameters to your own taste, you can save them on disk or cassette for future use.

One option of the word



Two cartridge ports come as standard — an improvement on the HX10


The joystick and data recorder ports ranged along the right hand side



The MSX standard cursor keypad remains on the HX22

processor opening menu which seems to have little to do with word processing is that of communication via the built-in RS-232 interface. When this is selected you are prompted to set the transfer rate — six settings are permitted between 110 and 4800 baud.

You then have the choice of receiving text, which just opens the RS-232 until the end-of-file character comes through, sending text, which transmits the document you have in memory, or communications which gives you a 'chat' facility. The screen is split horizontally between incoming and outgoing data.

The RS-232 interface on the HX-22 is equipped with an on-off switch in case you want to use a different, plug-in RS-232, like the Computermates cartridge. Switching off the on-board unit eliminated any possibility of a clash, whereby each fights for priority over the other.

LIKES

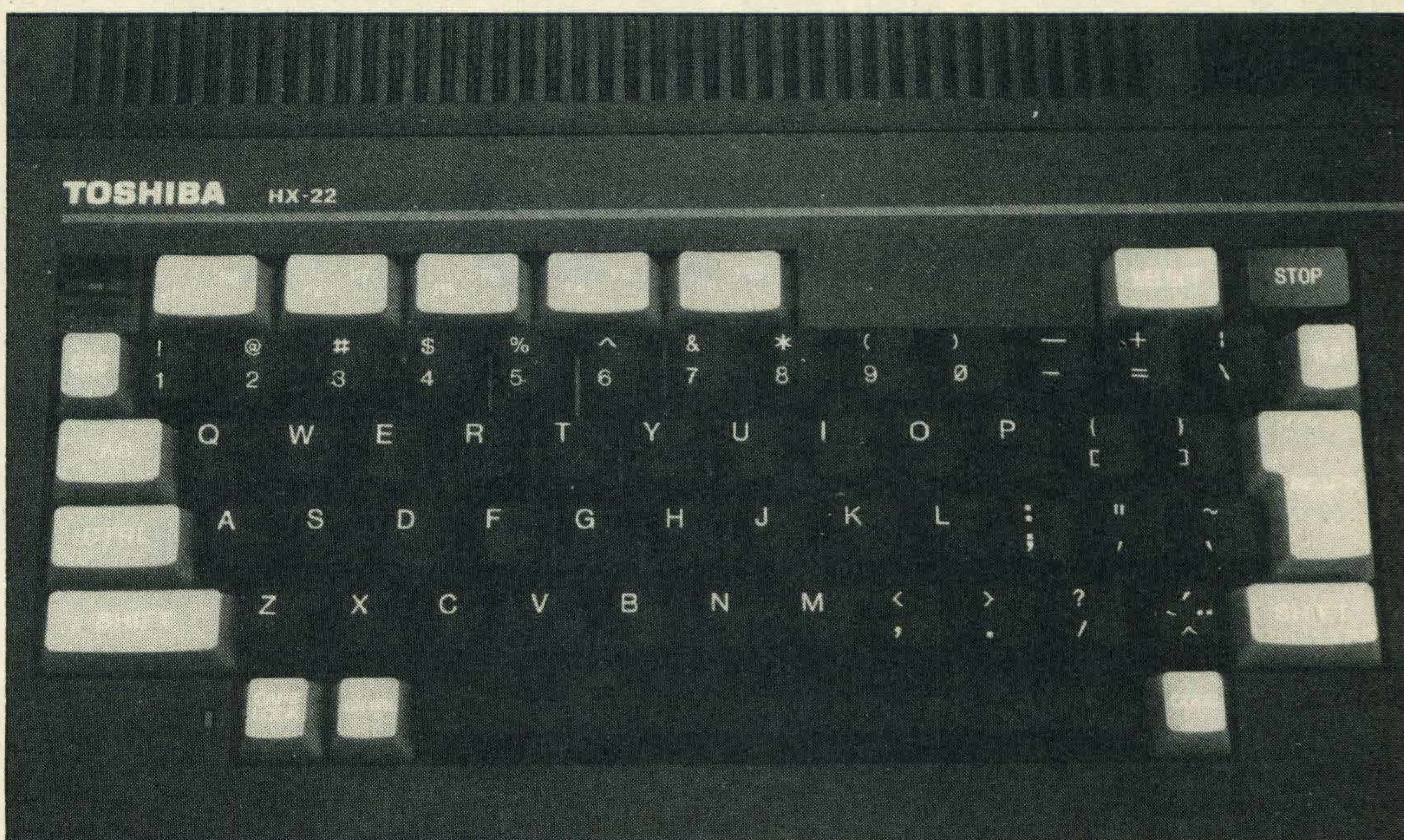
- Built-in software
- RS-232 provided
- Two cartridge ports
- Attractive styling

The HX-22 is a significant improvement over the basic MSX specification, which does not compromise MSX compatibility in any way. The RS-232 interface in particular is something the MSX specification should have included as standard to start with.

The word processor is the best we have seen on MSX, and, with the addition of a printer, makes the computer suitable for the production of letters, memos or articles up to about 3000 words in length (about the same as three pages of wall-to-wall magazine printing).

Much depends on Toshiba's pricing policy, which at the time of going to press had not been decided. We would like to see the HX-22 sell for no more than £100 more than the HX-10, otherwise it might not enjoy the sales success it deserves.

The fact that we managed to use the machine quite happily without any documentation says quite a lot for the extra



The HX22 is definitely more stylish than its predecessor— a pity about that key response, though

ROM-based software. However, there are ways in which it remains slightly inelegant. In particular it seems wasteful of ROM space.

There are many places where slightly different, and unnecessarily wordy prompts are used, where the use of a few common routines would save space. The opening cityscape is also a waste of space to the end user.

DISLIKES

- Erratic key response
- Wasted ROM space

However, the combination of the RS-232 and word processor makes the HX-22 particularly attractive to anyone wanting a low-cost way of logging on to commercial databases, and bulletin boards. An 80-column display would improve matters, and remove the necessity to read words transmitted from a remote computer which are arbitrarily split by the 40-column restriction.

Verdict

Certainly this is the best MSX machine so far for the mainstream computer enthusiast, rather than those with a particular specialised interest, such as music or video. It is also a significant improvement over Toshiba's previous offering in terms of style. But a lot depends on whether the company can sell it at a reasonable price.

TOSHIBA HX-22 £TBA

SPECIFICATION



CPU	Z80A equivalent (3.6MHz clock)
MEMORY	
RAM	64K
ROM	32K MSX BASIC plus ROM software
VIDEO RAM	16K
KEYBOARD	
TYPE	Full travel
KEYS	48 alphanumeric 21 control keys Cursor keypad
NUMERIC KEYPAD	No
VIDEO DISPLAY	
TEXT	40 characters— 24 lines
GRAPHICS	Maximum resolution 256 × 192 pixels
COLOURS	16
SPRITES	32
OUTPUT	RF (TV) Composite monitor RGB monitor
SOUND	
GENERATOR	3 channels with 8 octave range
OUTPUTS	Mono audio output
INTERFACES	
JOYSTICKS	2 MSX standard
EXPANSION BUS	None
CARTRIDGE PORT	2
PRINTER	Centronics
SERIAL PORT	RS232
CASSETTE	8-pin DIN
RESET	No
DIMENSIONS	420 × 220 × 75mm (W × D × H)
WEIGHT	2.7Kg
POWER SUPPLY	Internal
FINISH	Black plastic case
SOFTWARE INCLUDED	Built-in word processor and communications software
DISTRIBUTOR	Toshiba UK Ltd, Toshiba House, Frimley Road, Frimley, Camberley, Surrey GU16 5JJ Tel: (0276) 62222

THE STORY SO FAR

Over the next six pages we look at each of the MSX micros available in this country to date

It's only a year since MSX micros first appeared in Britain and already eleven different machines inhabit computer departments all over the country. MSX is proving itself as a force to be reckoned with in the home computer field and is definitely here to stay.

Although all machines have been constructed to satisfy a set of minimum MSX requirements, the variations in design, appearance, specifications and price is so great that eleven unique-looking machines have been produced. It's now possible to choose a computer as if you were buying a dress or a suit.

Take the Sony Hit Bit, an elegant stylish machine. It is the only one to incorporate a 16K ROM chip containing an address book program and is also one of only two MSX micros to include an RGB socket, invaluable if you intend to take advantage of the quality displays generated by an RGB monitor. JVC's HC-7 is the other one. Toshiba's HX-10, on the other hand, sticks to a fairly standard configuration.

Variations

Design variations lie in the inclusion of lightpen holders, either one or two cartridge ports, reset buttons, numeric keypads, music synthesiser chips and even small things such as the feel of the keyboard, function key size or colour schemes.

The machines appear to be so different that there is one to suit every personality and pocket. Prices range from £139 for the Goldstar FC-200 to £299 for the Sony Hit Bit and Sanyo MCP-100.

Competition between the machines is inevitable and Mitsubishi in particular has made great efforts to make its machines attractive with substantial price reductions, free quality software packs and even an offer to take £50 off the machine's price in exchange for your old computer.

Great bargains exist in shops such as Underwoods and Dixons where, for example, the Sony Hit Bit and Panasonic CF-2700 have been reduced to £99. These offers are regional and only exist while stocks last.

The next wave of MSX computers is starting to arrive in the country, such as Spectravideo's X'Press, Toshiba's HX-22 and Pioneer's CX-7.

Like the Yamaha with its inbuilt FM synthesiser chip, each one is respectively individualised with special features such as built-in disk drives, word processors and P-BASIC (a graphics language enabling the machine to control video images and superimpose text and graphics on screen), while still conforming to MSX standards.

To help you make an informed choice, we've summarised the eleven existing MSX computers. Some excellent bargains can be found so look around before parting with any hard-earned cash.

CANON V-20 £280

Stylishly chunky—that's probably the best way of describing the Canon V-20. The sleek black case, adorned with the orange and white Canon logo, and the mixture of dark and pale grey keys combine to give this machine a modish professional look.

Noticeable features on the Canon are its huge cursor keys and the array of large function keys across the top. These would be perfect for programming and especially for games play, but unfortunately, favourable first impressions are let down a little by the keyboard's feel.

Key response is spongy and they click when pressed. When handled, the keys together with the casing feel cheap and 'plasticy'. Word processing large quantities of text can be trying, particularly as the space bar is a little short. The RETURN key, however, is large and well-placed for typists.

Unusual features include the plastic protective covering on the two cartridge ports and the clever positioning of the two joystick ports at the front of the machine — the usual location on an MSX micro is at the side.

A reset button is absent from the Canon, but the back of the micro contains the usual array of interface ports; Centronics printer, 8-pin DIN cassette and the video, audio and RF (for connection to TVs) phono sockets.

Costly

No software or special offers accompany the micro, which at £280 is costly. The introduction manuals are the standard MSX offering and teach first time users to do things such as connect the machine to a TV and a bit of MSX BASIC programming.

Rounded corners, a smart colour scheme and well placed ventilation shafts give this machine its good looks, but the beauty is just a little skin deep.

If you like playing games, especially the *Track and Field* variety, the Canon's huge cursor keys are absolutely ideal, but £280 is a lot to pay for a games playing machine only.

SPECIFICATIONS



CPU	Z80A 3.6MHz clock
MEMORY	RAM 64K ROM 32K MSX BASIC VIDEO RAM 16K
VIDEO DISPLAY	40 characters × 24 lines Resolution: 256 × 192 pixels 16 colours 32 sprites
OUTPUTS	TV, composite video monitor, mono audio
SOUND	3 channels 8 octaves
KEYBOARD	48 alphanumeric keys, 21 function keys, cursor keypad
INTERFACES	2 joystick ports 2 cartridge ports 1 Centronics printer port, 1 8-pin DIN cassette port
RESET BUTTON	No
DIMENSIONS	397 × 218 × 60mm W × D × H
WEIGHT	2.4Kg
SOFTWARE INCLUDED	None
ACCESSORIES	1 video cable 1 audio cable Instruction manuals
DISTRIBUTOR	Canon (UK) Ltd Manor Road Wallington Surrey SM6 0AJ Tel: 01-773 3173

GOLDSTAR FC-200 £139

Although the Goldstar FC-200 lacks some of the panache, dash and sophisticated good looks of some of the other MSX micros, the emphasis is on value for money and durability.

A £139 price tag makes it the cheapest of the MSX machines, but the cost has nothing to do with inferior quality. All machines are imported from Korea where labour costs are so low that British distributors can afford to keep prices down.

No 'Design of the Year' awards will be won by the Goldstar, but we've found it to be durable and very usable. A common MSX fault is a breakdown in the video or joystick port connections, but our office Goldstar has never suffered these or any other ailments.

The Goldstar is a colourful computer with a two tone light and dark grey casing, off-white alphanumeric keys and a selection of multi-coloured function keys; red STOP key, green CODE and GRAPH keys and a bright blue cursor keypad. LEDs indicate whether the CAPS LOCK or CODE keys are activated. Programming is made easy with these colourful aids.

Interfaces on the machine, apart from the lightpen holder and the absence of a reset button, present no surprises. Unfortunately a 50 pin expansion bus — virtually useless as the majority of peripherals use the cartridge-type connector — has been fitted.

Inexpensive

The alphanumeric keys are perfect for word processing; the keys are springy and have a roughened surface with a grip good enough for touch typing. But the small RETURN key is a disappointment as is the absence of a £ sign.

As an inexpensive all round family computer, which is going to get knocked around and have tea and biscuit crumbs dropped into it, the Goldstar has no competitor. At £139 it is certainly one of the best MSX bargains around.

SPECIFICATIONS



CPU	Z80A 3.6MHz clock
MEMORY	RAM 64K ROM 32K MSX BASIC VIDEO RAM 64K
VIDEO DISPLAY	40 characters × 24 lines Resolution: 256 × 192 pixels 16 colours 32 sprites
OUTPUTS	TV, composite video monitor, mono audio
SOUND	3 channels 8 octaves
KEYBOARD	48 alphanumeric keys, 21 function keys, cursor keypad
INTERFACES	2 joystick ports 1 expansion bus 1 cartridge port 1 Centronics printer port, 1 8-pin DIN cassette port
RESET BUTTON	No
DIMENSIONS	400 × 260 × 63mm W × D × H
WEIGHT	4.7Kg
SOFTWARE INCLUDED	1 Vacuumania game Demonstration program
ACCESSORIES	1 RF cable 1 cassette cable Operating manual MSX BASIC manual
DISTRIBUTOR	Spectrum 500 Hunting Gate Hitchin Herts SG4 OTJ

JVC HC-7 £279

JVC has always kept itself at the higher end of the consumer electronics market with top quality products such as TVs, hi-fis and video recorders that not only feel and look good, but more importantly are good. The HC-7, like everything else from JVC, is a sleek, well constructed, good looking computer.

The company doesn't go in for the cut-price tactics used by some companies when sales are slow, and at £279, the HC-7 is still one of the most expensive computers. Fortunately it has enough extras to keep it head and shoulders above the crowd.

A silver and dark grey casing, with an unusually high rear section characterises this micro. The alphanumeric keys are off-white, but unfortunately the function keys are all the same grey as the casing — the lack of differentiation can lead to mistakes, particularly when programming.

All the usual interfaces and sockets are included on the machine plus a few more. It is one of the few with a reset button, but this is placed at the back where it's difficult to reach.

More important is the addition of the RGB monitor socket. This welcome extra enables the machine to link up to an RGB monitor producing a clear, flicker-free colour image on screen (see the monitors section on page 72).

Protective plastic coverings for the vulnerable joystick ports illustrates the kind of care JVC takes over its products.

Ideal

Its steep sloping keyboard is not to everyone's liking, but this together with the slightly scalloped keys and large RETURN key makes it ideal for word processing.

The HC-7's main strength is that it is the product of a well-established company holding an impressive record for good quality products. It's also a well-designed, attractive computer.

SPECIFICATIONS



CPU	Z80A 3.6MHz clock
MEMORY	RAM 64K ROM 32K MSX BASIC VIDEO RAM 16K
VIDEO DISPLAY	40 characters × 24 lines Resolution: 256 × 192 pixels 16 colours 32 sprites
OUTPUTS	TV, composite video monitor, RGB monitor Mono audio
SOUND	3 channels 8 octaves
KEYBOARD	49 alphanumeric keys, 24 function keys, cursor keypad
INTERFACES	2 joystick ports 2 cartridge ports 1 Centronics printer port, 1 8-pin DIN cassette port
RESET BUTTON	Yes
DIMENSIONS	382 × 286 × 87.5mm W × D × H
WEIGHT	2.8Kg
SOFTWARE INCLUDED	None
ACCESSORIES	1 cassette cable 1 RF cable Operating manual
DISTRIBUTOR	JVC (UK) Ltd Eldon Wall Trading Estate Priestley Way London NW2 7BA Tel: 01-450 2621

MITSUBISHI ML-F48 £219

Mitsubishi has taken a calculated gamble importing the 32K ML-F48 into a British home computer market where the 64K micro rules OK.

In Japan, 32K, 16K and even 8K MSX computers have been selling like hot cakes, the 64K computer being the rarity rather than the norm as in Britain.

The shortage of memory doesn't seem to bother the Japanese buyers and there is no reason why it should bother us. With the exception of Melbourne Houses's adventure game, *The Hobbit*, this machine has loaded every other program we have tried with it. There is also no disadvantage to BASIC programmers as it has virtually the same BASIC memory as a 64K computer.

Problems will arise if you need to save vast quantities of machine code programming or intend to use MSX-DOS and CP/M software — but extra memory can always be obtained from cartridge RAM packs.

Lookswise the machine is a snappy metallic silver and black with off-white alphanumeric and grey function keys. Some of the function keys are too small, but the cursor keypad is one of the best. The keyboard has a solid feel and presents no problems for word processing.

All the usual sockets and ports are arranged around the machine, but the reset button is absent.

Competitive

Price is the main advantage of this machine — it's a cool £219 which when put together with the free software worth £45 makes it a pretty competitive package. Mitsubishi is also running an offer whereby you can exchange your old computer and get £50 off the ML-F48's price.

Mitsubishi has gone out of its way to make this computer competitive and it's definitely a machine worth a second glance despite its memory limitations.

SPECIFICATIONS



CPU	Z80A 3.6MHz clock
MEMORY	RAM 32K ROM 32K MSX BASIC VIDEO RAM 16K
VIDEO DISPLAY	40 characters × 24 lines Resolution: 256 × 192 pixels 16 colours 32 sprites
OUTPUTS	TV, composite video monitor, mono audio
SOUND	3 channels 8 octaves
KEYBOARD	48 alphanumeric keys, 21 function keys, cursor keypad
INTERFACES	2 joystick ports 2 cartridge ports 1 Centronics printer port, 1 8-pin DIN cassette port
RESET BUTTON	No
DIMENSIONS	370 × 270 × 70mm W × D × H
WEIGHT	2.7Kg
SOFTWARE INCLUDED	Demo + 2 games, Blagger, Les Flics, Mr Wong's Loopy Laundry, Eric and the Floaters, Chuckie Egg, Shark Hunter
ACCESSORIES	1 RF cable 1 cassette lead Instruction manual
DISTRIBUTOR	Mitsubishi Electric Otterspool Way Watford, Herts Tel: (0923) 770000

MITSUBISHI ML-F80 £275

In contrast to the snappy 32K ML-F48, Mitsubishi's 64K computer, the ML-F80 is a rather staid, solid looking computer.

No risks have been taken with this rather unstimulating micro; no unusual design features, no outrageous colour schemes, no special interfaces. But, it does incorporate all the compulsory MSX features to produce a reliable, non-pretentious MSX computer.

The casing is unexciting, in black and grey, livened up only with the Mitsubishi logo. Off-white alphanumeric and pale grey function keys make up the keyboard. But while the appearance isn't exactly exuberant, it is neat and business-like.

Nothing is lacking on the socket and interface front; everything is as it should be and in keeping with the non-innovative style adopted by Mitsubishi for the machine.

Sloping slightly, the keyboard with its concave keys is good enough for word processing and rapid program entry, despite the keys' mushy feel, which occasionally makes it difficult to ascertain whether a particular letter has registered.

A chunky cursor keypad is ideal for games playing, although some people may dislike the distance between the four keys. Function keys are too small for comfort.

It's selling for £275, comparable in price to the Canon, Panasonic and JVC computers. These more stylish machines provide a lot of competition but the accompanying £45 software pack makes a difference as does Mitsubishi's offer to exchange old computers for a hefty £50 off the ML-F80's price.

This machine won't pull in the crowds, but it's a good solid MSX computer that does everything it's supposed to do. It's worth considering, but the question is whether the Mitsubishi offers are enough to sway a fashion conscious British public from choosing a more stylish machine.

SPECIFICATIONS



CPU	Z80A 3.6MHz clock
MEMORY	RAM 64K ROM 32K MSX BASIC VIDEO RAM 16K
VIDEO DISPLAY	40 characters × 24 lines Resolution: 256 × 192 pixels 16 colours 32 sprites
OUTPUTS	TV, composite video monitor, mono audio
SOUND	3 channels 8 octaves
KEYBOARD	48 alphanumeric keys, 21 function keys, cursor keypad
INTERFACES	2 joystick ports 2 cartridge ports 1 Centronics printer port, 1 8-pin DIN cassette port
RESET BUTTON	No
DIMENSIONS	370 × 270 × 70mm W × D × H
WEIGHT	2.7Kg
SOFTWARE INCLUDED	Demo + 2 games, Blagger, Les Flics, Mr Wong's Loopy Laundry, Eric and the Floaters, Chuckie Egg and Shark Hunter
ACCESSORIES	1 RF cable 1 cassette lead Instruction manual
DISTRIBUTOR	Mitsubishi Electric (UK) Ltd Otterspool Way, Watford, Herts Tel: (0923) 770000

PANASONIC CF-2700 £280

Smart, aggressive and distinctive, the Panasonic stands out in a crowd. Where most manufacturers have been content to go for a conservative style Panasonic has dared to be different.

At £280 it is fairly pricey, but it's the sort of attention grabbing machine that you want as soon as you've seen it.

Larger than any of the other MSX micros, its size and the impressive matt black casing give this machine its handsome business-like looks. The keyboard is a combination of dark and pale keys contrasting with the green lettering of the Panasonic logo and cursor arrow keys.

Two cartridge slots, handily situated on the top, together with the familiar MSX socket and interface arrangements means that no out-of-the-ordinary connections are included on this micro.

The cursor keypad is ideal for games, but a few of the function keys are far too thin for effective programming. On the other hand, the alphanumeric keys are ideal for word processing with their slightly scallopped surface and solid feel. It also has a large RETURN key.

As well as the usual RF and cassette leads, the CF2700 comes with two other useful cables; video and audio. A few dealers are supplying free Panasonic cartridge games with the machines, but that's not standard practice.

A sheet of graphic labels — for sticking on the relevant keys — is also supplied. This is a nice idea — stick them to the keys and you won't have to refer to manuals to find out how to get musical or other special characters by means of pressing the GRAPH key simultaneously.

Nice Idea

Panasonic's design team has done well with this computer. But, although the MSX requirements have been interpreted so well, it's a shame nothing new has been incorporated.

SPECIFICATIONS



CPU	Z80A 3.6 MHz clock
MEMORY	RAM 64K ROM 32K MSX BASIC VIDEO RAM 16K
VIDEO DISPLAY	40 characters × 24 lines Resolution: 256 × 192 pixels 16 colours 32 sprites
OUTPUTS	TV, composite video monitor, mono audio
SOUND	3 channels 8 octaves
KEYBOARD	48 alphanumeric keys, 21 function keys, cursor keypad
INTERFACES	2 joystick ports 2 cartridge ports 1 Centronics printer port, 1 8-pin DIN cassette port
RESET BUTTON	No
DIMENSIONS	426 × 249 × 91mm W × D × H
WEIGHT	3.5Kg
SOFTWARE INCLUDED	None
ACCESSORIES	1 RF cable, 1 video cable, 1 audio cable 1 cassette lead Instruction manual BASIC manual Sheet of graphic labels
DISTRIBUTOR	Panasonic (UK) Ltd 300-318 Bath Road Slough, Berks SL1 6JB

SPECIFICATIONS



CPU	Z80A 3.6MHz clock
MEMORY	RAM 64K ROM 32K MSX BASIC VIDEO RAM 16K
VIDEO DISPLAY	40 characters × 24 lines Resolution: 256 × 192 pixels 16 colours 32 sprites
OUTPUTS	TV, composite video monitor, mono audio
SOUND	3 channels 8 octaves
KEYBOARD	48 alphanumeric keys, 21 function keys, cursor keypad
INTERFACES	2 joystick ports 2 cartridge ports 1 Centronics printer port, 1 8-pin DIN cassette port
RESET BUTTON	Yes
DIMENSIONS	385 × 240 × 63mm W × D × H
WEIGHT	2.2Kg
SOFTWARE INCLUDED	3 cassettes (demonstration program, 2 games, 2 educational)
ACCESSORIES	1 RF cable 1 cassette lead Instruction manual
DISTRIBUTOR	Sanyo Marubeni (UK) Sanyo House, 8 Greycaine Road, Watford, Herts Tel: (0923) 46363

SANYO MPC-100 £299

Computers are nothing new to Sanyo. It's been producing 8- and 16-bit business machines for some time and is one of the only MSX-manufacturing companies to have past experience in computers. It even has its own computer dedicated factory.

With its business computer background, Sanyo naturally opted for a professional, business-like style for its machine. One of the lightest of the MSX micros, the MPC-100 is a flattish, slim machine with an attractive silver and black case — none of the fancy colours and shades incorporated into some of the others.

In fact some shading would be desirable as the function and alphanumeric keys are all completely black making it fairly easy to press the wrong ones. Key layout is much the same as on other machines, although it has some nice traits; largish RETURN and function keys, and a solidly constructed cursor keypad.

Key response is firm and positive, just right for trouble-free word processing and inputting long programs.

Sockets and ports are standard, although there are two extra features; a reset button and light pen holder which is rather suitable as Sanyo manufactures the only available MSX lightpen, the MLP-001 for £90.

Solid

Overall finish of the machine is almost faultless; it looks great, is solidly constructed, works well, but for £299 we can't help feeling there should be something else, an RGB output perhaps.

No effort has been made by Sanyo to make this machine an atrractive proposition to buyers price-wise. It is a well-built solid machine but has absolutely nothing except its high price to distinguish it from the rest.

Perhaps Sanyo is hoping that its excellent reputation for consumer electronics goods will be enough to persuade people to buy.

SONY HB-75 £299

Akio Morita, Sony's jet-setting chief executive is responsible for many of Sony's successes in the consumer electronic world. His innovative ideas and foresight have influenced many of Sony's products and by the looks of the Sony Hit Bit, he's had a hand in that as well.

Of all the MSX micros reviewed here, Sony's Hit Bit is probably the best interpretation of the MSX standard. It incorporates all the MSX essential features plus a few extras, including a 16K ROM chip (in addition to the ROM with 32K MSX BASIC) containing an organiser program.

This chip provides four extra options to the usual blue and white MSX BASIC screen; Address, Schedule, Memo and Data Transfer. These functions operate together to produce a kind of computerised address book and diary.

It is probably the best looking of the machines with a smart jet black casing and a black and grey keyboard. Function keys are too small and the cursor keys occasionally get stuck underneath the casing, but on the plus side, the keys respond smoothly and positively during word processing and the RETURN key is one of the biggest.

In addition to the usual interfaces, a RGB socket for monitors and a red reset switch positioned on the keyboard are included on the machine.

Elegance

Sony, in keeping with its daring reputation, was one of the first companies to bring in a £350 3.5 inch disk drive as well as a £40 4K data cartridge offering an extra storage facility.

Sony's Hit Bit shows the rest of the MSX micros what the MSX standard could be. It combines style and elegance with a business-like professional appearance. The inclusion of that built-in address book system makes it a high class family computer — it is pricey, but it's worth it, especially when you consider some of the discounts now available.

SPECIFICATIONS



CPU	Z80A 3.6MHz clock
MEMORY	RAM 64K ROM 32K MSX BASIC VIDEO RAM 16K
VIDEO DISPLAY	40 characters × 24 lines Resolution: 256 × 192 pixels 16 colours 32 sprites
OUTPUTS	TV, Composite video monitor, RGB monitor Mono audio
SOUND	3 channels 8 octaves
KEYBOARD	48 alphanumeric keys, 25 function keys, cursor keypad
INTERFACES	2 joystick ports 2 cartridge ports 1 Centronics printer port, 1 8-pin DIN cassette port
RESET BUTTON	Yes
DIMENSIONS	400 × 245 × 66mm W × D × H
WEIGHT	3Kg
SOFTWARE INCLUDED	Inbuilt address book system
ACCESSORIES	1 RF cable 1 cassette lead Instruction manual
DISTRIBUTOR	Sony (UK) Ltd Sony House, South Street, Staines, Middlesex

SPECIFICATIONS



CPU	Z80A 3.6MHz clock
MEMORY	RAM 64K ROM 32K MSX BASIC VIDEO RAM 16K
VIDEO DISPLAY	40 characters × 24 lines Resolution: 256 × 192 pixels 16 colours 32 sprites
OUTPUTS	TV, Composite video monitor, mono audio
SOUND	3 channels 8 octaves
KEYBOARD	64 alphanumeric keys, 22 function keys, cursor keys Numeric keypad
INTERFACES	2 joystick ports 1 expansion bus 1 cartridge port 1 Centronics printer port, 1 8-pin DIN cassette port
RESET BUTTON	No
DIMENSIONS	405 × 215 × 72mm W × D × H
WEIGHT	2.3Kg
SOFTWARE INCLUDED	None
ACCESSORIES	1 RF cable, 1 audio cable, power supply Instruction manual
DISTRIBUTOR	Spectravideo Ltd 165 Garth Road, Morden Surrey SM4 4LH

SPECTRAVIDEO SV1-728 £250

One of the first companies to develop an MSX BASIC-type language, Spectravideo used a version of it in two of its computers, the SV1-318 and SV1-328. These, although not full MSX machines, were used by many companies to develop MSX software.

Spectravideo's SV1-728 was one of the first MSX machines to arrive in the country and is a visually distinctive machine. It has an off-white casing, a two-tone grey keyboard and a numeric keypad, a feature not included on any of the other MSX machines.

Right from the start, Spectravideo aimed its machine at the business end of the MSX market, a strategy confirmed by the company's latest MSX import, the X'Press at a price of about £400 (reviewed on page 38).

The keyboard is unusual; arrowed keys instead of the usual chunky cursor keypad, a number of extra keys (some containing LED lights) and the numeric keypad which contributes to the unusually large amount of alphanumeric keys. In effect the keyboard is cluttered, although the keys are firm and bouncy enough for word processing.

It has all the usual interfaces, but unfortunately a (currently) virtually useless expansion bus has been installed rather than a second cartridge port.

Another noticeable feature is its external transformer — most of the MSX micros incorporate these internally.

Spectravideo has deliberately discouraged games players by omitting a distinctive RETURN key and cursor keypad.

There are no special price reductions to encourage buyers and anyone thinking about a business machine would be well advised to spend a little more and get the X'Press (if and when it becomes available).

TOSHIBA HX-10 £239

Very similar in appearance to the Goldstar, Toshiba's HX-10 is a colourful, compact computer. It contains no features other than those specified as the standard MSX requirements and this has probably helped Toshiba to reduce the price tag, formerly £280, to £239.

Coloured in dark and light grey, and almost covered by a ventilation grille, the HX-10 is one of the smallest of the MSX micros.

Alphanumeric keys are the usual off-white, but the function keys are a multi-coloured affair; most of them are dark grey, but the cursor keypad is bright blue, the STOP key is red and the GRAPH key, a vivid green.

Toshiba has aimed its machine at home users, putting the emphasis on games with the huge RETURN key and lively cursor keypad. Keystroke is a little too shallow for large amounts of word processing, but the function keys are well placed and large enough to facilitate long hours of programming. It has no reset button.

A slight problem is the backspace key which is rather small for something that is used so often.

Interfaces and socket connections hold no surprises, except that a less-than-useful expansion bus has unfortunately replaced the second cartridge port.

Reasonable

Toshiba's £239 price tag is reasonable, especially if you consider the three programs offered free with the computer; two great games—*Hunchback* and *Manic Miner*, and the educational *French is Fun*. These offers are only on while dealer stocks last.

Toshiba has worked to produce a computer that satisfies the minimum MSX requirements cheaply and efficiently. It is the Mr Average of all the MSX computers; squat, square and fairly unexciting. Still, £239 is definitely not a price to be sniffed at.

SPECIFICATIONS



CPU	Z80A 3.6MHz clock
MEMORY	RAM 64K ROM 32K MSX BASIC VIDEO RAM 16K
VIDEO DISPLAY	40 characters × 24 lines Resolution: 256 × 192 pixels 16 colours 32 sprites
OUTPUTS	TV, composite video monitor, mono audio
SOUND	3 channels 8 octaves
KEYBOARD	48 alphanumeric keys, 21 function keys, cursor keypad
INTERFACES	2 joystick ports 1 expansion bus 1 cartridge port 1 Centronics printer port, 18-pin DIN cassette port
RESET BUTTON	No
DIMENSIONS	370 × 245 × 60mm W × D × H
WEIGHT	2.8Kg
SOFTWARE INCLUDED	1 demonstration cassette, French is Fun, Hunchback and Manic Miner
ACCESSORIES	1 RF cable 1 cassette lead Instruction manual BASIC manual
DISTRIBUTOR	Toshiba (UK) Ltd Frimley Road, Frimley, Camberley, Surrey GU16 5JJ

YAMAHA CX-5M £449

When the MSX computer standard was first announced, it was heralded as being just part of a new concept in home entertainment. So far, Yamaha is the only company to have fulfilled that claim, although the Pioneer (reviewed on page 18) is soon to offer more with its interactive video system.

The CX5M is not just a computer, but also a music synthesizer. The secret to the CX5M's dual function is its built in synth, the FM Sound Synthesizer. FM stands for Frequency Modulation and refers to the way sounds are generated.

A keyboard is needed to take advantage of the synthesizer's ability, putting the system's price up by £85 or £165 for Yamaha's Mini and Standard keyboards respectively.

With its slim stylish black casing and black and grey keyboard, Yamaha's computer looks superb. Unfortunately it has only 32K of user memory and just one cartridge port. Still, most people will be buying it for the musical capabilities, so these shortcomings won't matter too much.

The internal synthesizer has a number of features: up to eight sounds can be generated; it provides a preset range of 46 voices covering everything from woodwind to bells, train noises and percussion. Solo bass and rhythm chords can be generated to accompany the music. In short, sophisticated music can be composed with the minimum of effort.

Versatile

Other cartridge programs available for use with the synth are the *Music Composer*, two voicing programs and a *Music Macro*, all at £36. Accompanying manuals explain everything clearly and precisely.

As an MSX computer, the CX5M has a few shortcomings, but as a synthesiser for the home or even a music studio, it is a versatile, easy-to-use music making machine. If you're musically inclined, give it more than a second look.

SPECIFICATIONS



CPU	Z80A 3.6MHz clock
MEMORY	RAM 32K ROM 32K MSX BASIC VIDEO RAM 16K
VIDEO DISPLAY	40 characters × 24 lines Resolution: 256 × 192 pixels 16 colours 32 sprites
OUTPUTS	TV, composite video monitor, mono audio 2 stereo phone jacks 2 MINI DIN sockets
SOUND	3 channels 8 octaves
KEYBOARD	48 alphanumeric keys, 21 function keys, cursor key pad
INTERFACES	2 joystick ports 1 expansion bus 1 cartridge port Centronics printer port, 1 8-pin DIN cassette port keyboard socket
RESET BUTTON	No
DIMENSIONS	422 × 207 × 68mm W × D × H
WEIGHT	2.7Kg
SOFTWARE INCLUDED	FM music synthesiser
ACCESSORIES	1 RF cable 1 cassette cable 2 instruction manuals
DISTRIBUTOR	Yamaha Kemble Music (UK) Ltd Mount Avenue, Bletchley, Milton Keynes MK1 1JE Tel: (0908) 71771

WIN A YAMAHA SYSTEM

Say what you like about the Yamaha — and you could win a complete CX5M music micro outfit

You and Yamaha can make great music, if you're the lucky winner of our competition. We're giving away a complete Yamaha music micro system, comprising the CX5M computer, music keyboard, and two cartridges — the *FM Voicing Program* and the *Music Composer*.

The CX5M is a full spec 32K MSX micro with some vital extras. There's an FM synthesizer unit built-in, with stereo sound output and a MIDI interface for linking up to other instruments.

Plug in the keyboard and the FM Voicing Program and you can play away to your heart's content with a vast array of sounds at your disposal. Or plug in the other cartridge and compose your latest opus.

All you have to do to win this fabulous outfit is tell us what you think are the best features of the Yamaha. We've listed them below — you just have to put them in the correct order.

Write the letters on a postcard, and send it to: Yamaha Competition, *What MSX?*, 38-42 Hampton Road, Teddington, Middlesex TW11 0JE, to reach us not later than 14th October 1985.

The qualities to arrange are:
A) High quality keyboard
B) Built-in MIDI interface
C) Stereo output
D) Built-in FM synthesizer
E) MSX compatible



RULES

1. There is only one prize. The winning entry will be the first correct answer pulled from the bag after the closing date.
2. The judges' decision is final and no correspondence will be entered into.
3. The competition is not open to employees of Haymarket Publishing, their agents or suppliers, nor the employees of Kemble-Yamaha, or the families of said employees.
4. No overseas entries can be accepted.
5. Entries should be on a postcard clearly marked with the name and address of the entrant.
6. The winner will be notified personally. Please do not ring up with enquiries about the competition.
7. No entries will be accepted from Phil Rotsky, Juan Moore-Thyme or any other nom-de-pseud.


x'press
SVI MSX
DOS AND DISK BASIC

BUSINESS CLASS

SPECTRAVIDEO X'PRESS £399 approx

Not quite the next generation, but still a step forward, Spectravideo's new micro comes complete with a host of extras

A common, if misguided, criticism of MSX micros is that they're all pretty much the same. One or two may have extras, like the Sony's built-in software and the Yamaha's FM synthesizer, but on the whole they all have the same features.

Well, that wasn't quite true before and is even less true now. Spectravideo has announced a new micro — the X'Press — with more features than ever. We managed to get a look at an early pre-production sample which, although it wasn't quite finished, gave us a pretty accurate idea of what the final machine will be like.

At the heart of the X'Press is a standard, first generation MSX micro. But Spectravideo has thoughtfully provided some extremely useful extras. The most noticeable of these is a built-in 3.5 inch disk drive, which is perhaps the most important addition.

Then there is an RS232C port, which saves you having to buy a separate cartridge for communications work. And Spectravideo's 80-column card is built-in — or at least it will be. The sample we saw didn't have this particular feature, but the company assures us that it will be included in the final production models.

A final price hasn't yet been decided, but it has been hinted that £400 might be about right. If so, that makes the X'Press very inexpensive when you consider the extras you get with it — with other MSX micros you'd have to buy them separately, and none of them come cheap.

We'll look at each of these in turn. But first, what about the overall package? Well, for a start it's very portable. That doesn't mean you can use the X'Press on your lap in the train. After all, you still need a TV or monitor to plug into the micro, and a mains supply. But it does mean that the X'Press is easy to cart around.

For example, you might want to take the computer to a friend's house, or with you to work. Spectravideo has made this easy by supplying a smart carrying case. And with the built-in disk drive there's no need to lug around a separate drive or cassette recorder.

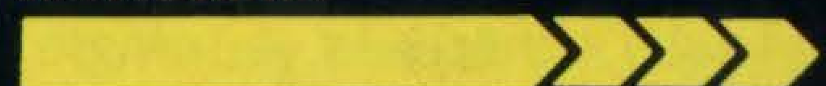
Once out of the carrying case the micro still gives an impression of neatness, with the possible exception of the power supply.

Unlike other MSX micros, the X'Press has a separate transformer. That seems a little odd when you're used to having the power supply built-in, but it makes life a little simpler for Spectravideo. The company can easily adapt the machine for different countries with different mains supplies just by changing the transformer.

The design of the X'Press is very stylish. The casing is slim, although it extends a fair distance back, and it's finished in the usual Spectravideo cream. It gives the impression of being a fairly robust micro. We haven't yet tried dropping it out of a window, but we can't detect any weak or unsupported points in the casing, and there are no rough edges.

The keyboard looks good at first, although we had a few problems actually using it. For one thing, there's virtually no colour coding — just two, very similar shades of cream for the various sets of keys. And some of the keys are rather too small, particularly STOP and ENTER.

Indeed, the tops of all the keys are a bit on the small side. However, they're pleasantly sculptutured and, in spite of a certain amount of rattle and sideways movement, the response is firm and positive. Perhaps the keys could be a little less spongy, but we still managed to achieve reasonable typing speeds with few lost letters.



The one thing we did miss compared with Spectravideo's previous MSX micro — the SVI-728 — was the separate numeric keypad. But something has to go when you're trying to make a compact machine.

There's almost no slope to the keyboard itself, but that doesn't mean that Spectravideo has ignored this aspect. At the back of the micro is a fold-out handle, complete with a couple of rubber feet. When this is swung down it tilts the whole computer, giving an excellent typing angle.

Pulling out the handle also reveals a row of connectors and ports. These are: the RS232C port; a connector for a second disk drive; a Centronics printer port; RF video output (for use with a normal TV); audio and video phono sockets to connect with a composite monitor; power socket to connect with the transformer; and finally the main ON/OFF switch.

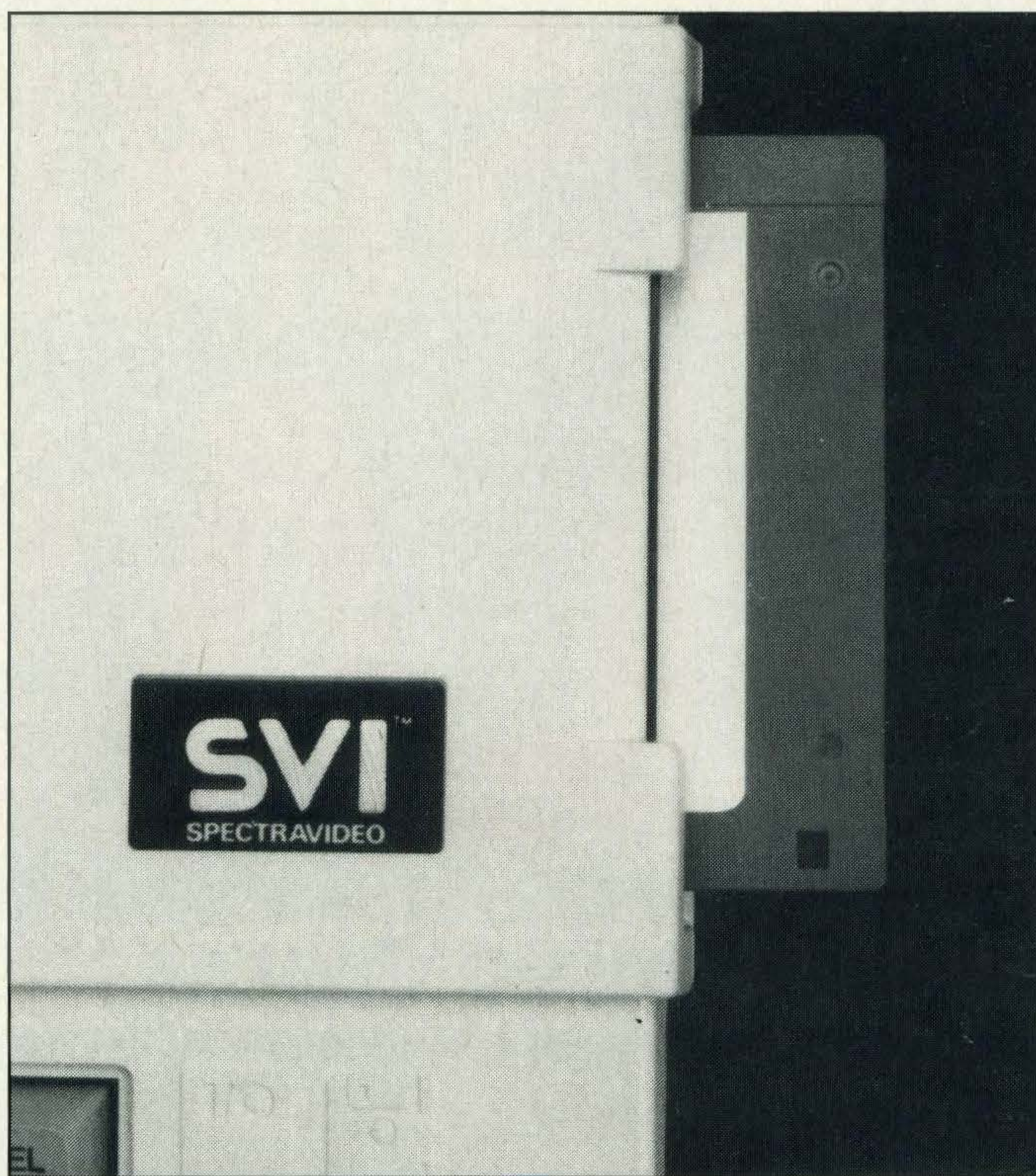
The composite monitor, TV and printer sockets are all standard MSX types. The RS232C socket, however, is unfortunately not standard, which means you're probably going to have to make up your own lead if you want to connect it to a modem, serial printer or some other peripheral.

The facility to link-up a second disk drive is very handy. The controlling software is supplied with the machine which probably means you can plug in any type of drive, although we'll need to find out a lot more about the disk system before we can confirm that. But if it's true it means that you could put together a two drive system relatively cheaply, because you're not having to buy a dedicated MSX disk unit.

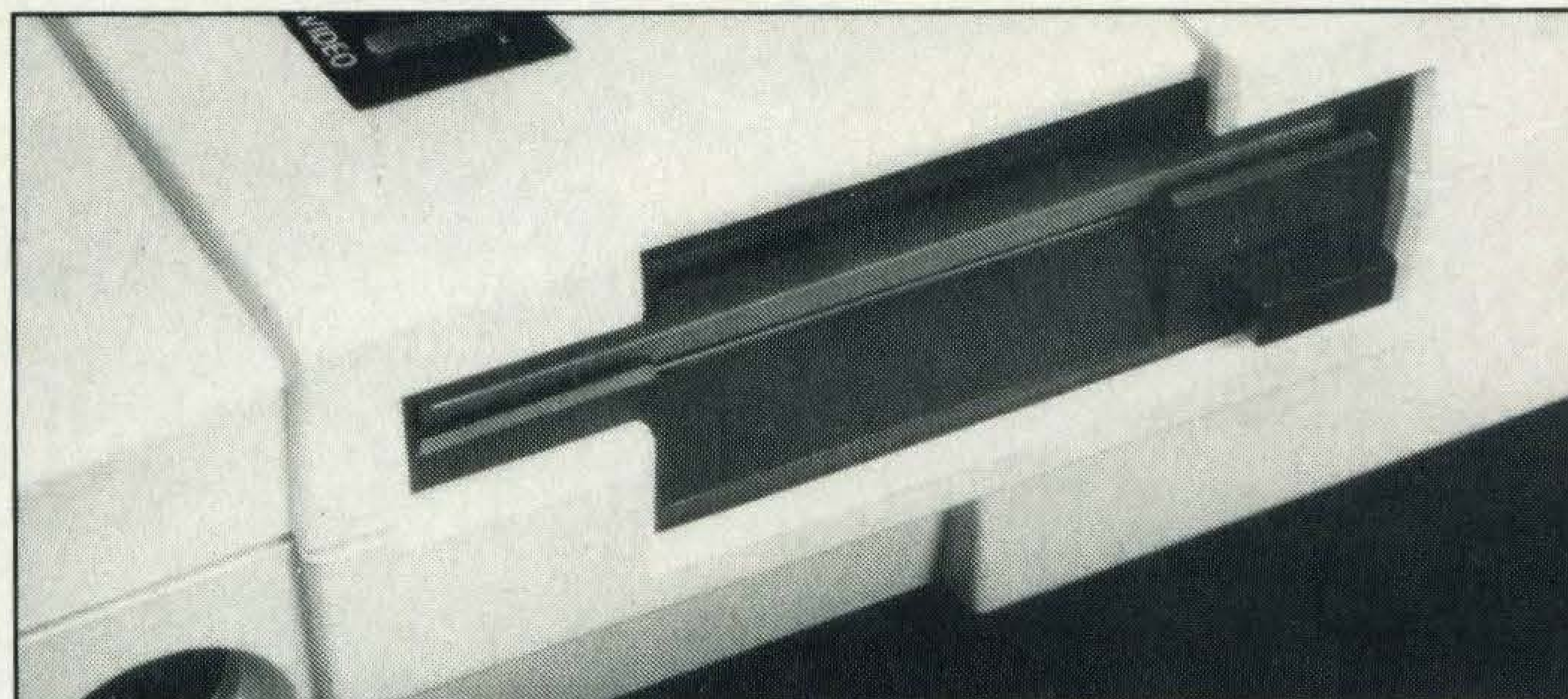
All the connectors on the back are covered and protected when the handle is folded up. That's very handy if you're moving the machine around as it stops dust and other nasty particles clogging up the sockets.

Most of the other sockets are on the right hand side. Moving from the front of the micro to the rear we encounter the two standard joystick ports, a normal MSX cassette port, and then the disk drive.

Lastly, there is a single cartridge port on the top of the machine. Of course, most MSX micros have two ports. But then, the X'Press has the built-in disk drive and RS232 port, each of which would normally take up a cartridge slot of its own.



The built-in disk drive seen from the top (above) and the side (below) is an attractive feature of the X'press, making it good value for money



Of all these bit and pieces, the one of interest to most people is the disk drive. As far as we can see it seems a pretty standard 3.5 inch model. It's completely compatible with the Sony drive, in spite of the price difference. So rather than buying the Sony drive (for around £350) you can pay a bit more, buy the X'Press and get a computer to go with the drive!

The drive was a bit noisy on occasions, but not worryingly so. And this could be put down to it being a pre-production sample. The one thing in its favour is that it seemed to generate virtually no heat — probably because there's no transformer on board.

Using the disk drive is easy. Slotting a disk into the drive causes the eject button to pop out, giving you an instant indication of whether there's a disk in place. When the disk is actually spinning (and so shouldn't be removed) a red light goes on just above the cursor keys. And really, that's all there is to the hardware side of it.

The next most interesting feature is undoubtedly the RS232C interface. Some people felt that this should have been provided as standard on all MSX micros.

Communications, where you use your micro to link up with other computers over the telephone network, is rapidly becoming one of the most popular areas of computing. But you need a modem to convert computer signals into telephone signals, and vice versa. And to use a modem you need an RS232 serial port on the computer.

Previous MSX computers have relied on RS232 adapter cartridges, costing around £100 upwards, to provide this facility. True, the cartridges also contain software, and some of it quite sophisticated. But communications software isn't difficult to write, and in any case, some fairly basic software is supplied on disk with the X'Press.

Like most micros, the X'Press comes packaged with some software. But it's a completely different type to the in-box software supplied with the other MSX computers.

You get two system disks for MSX-DOS and CP/M version 2.2. If you switch the micro on with either of these disks in the drive, the computer automatically boots-up into the operating system. If there's no disk in the drive, the micro defaults to normal MSX BASIC plus MSX disk BASIC, which is built into the machine.

The MSX-DOS supplied is version 1.01. It's the first time we've managed to get a look at the complete system, although parts of it have turned up before on the Aackosoft word processing and database program disks.

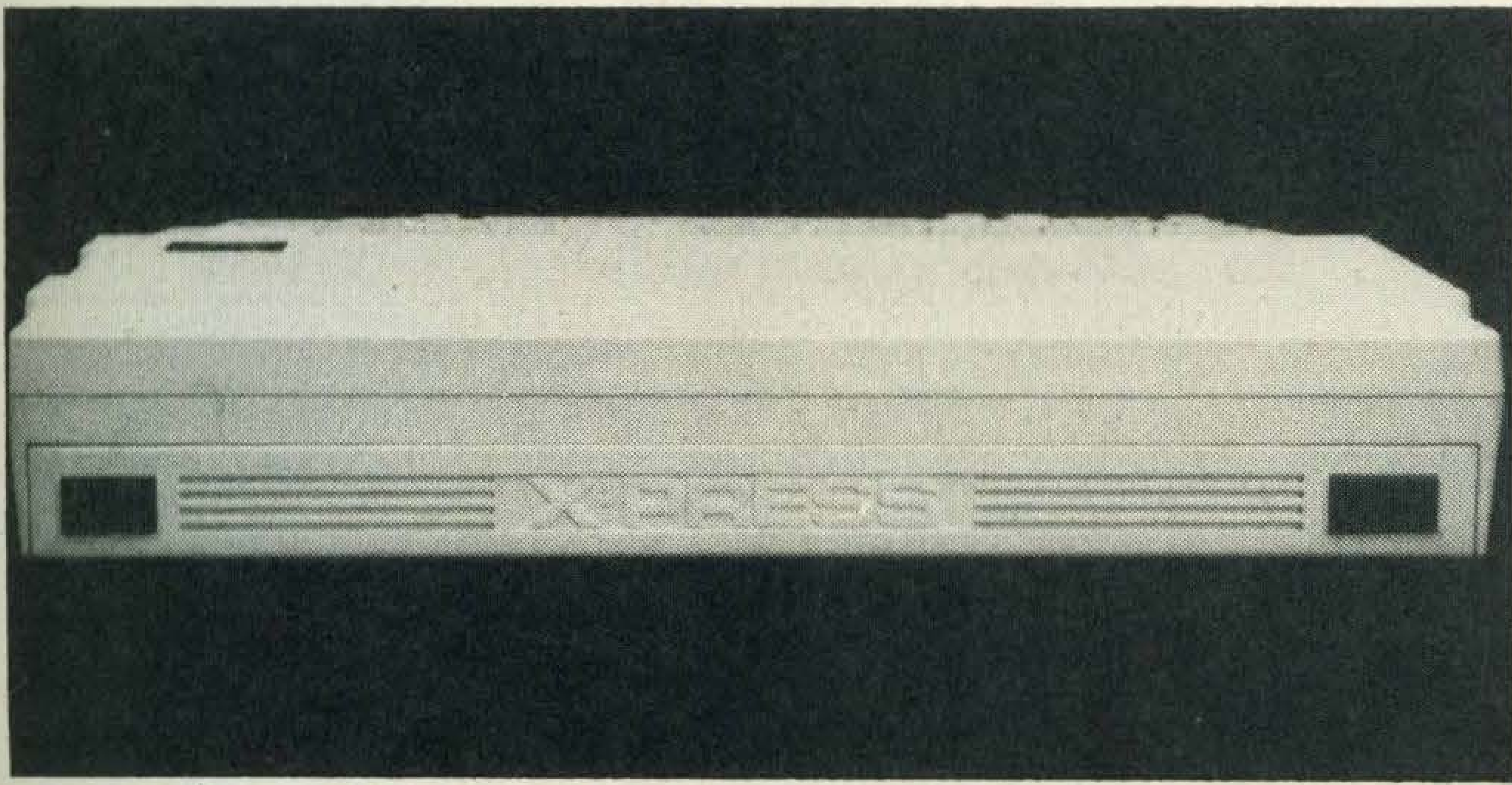
MSX-DOS seems to be pretty comprehensive and versatile. It operates in a very similar way to the industry-standard MS-DOS, from which it's obviously derived.

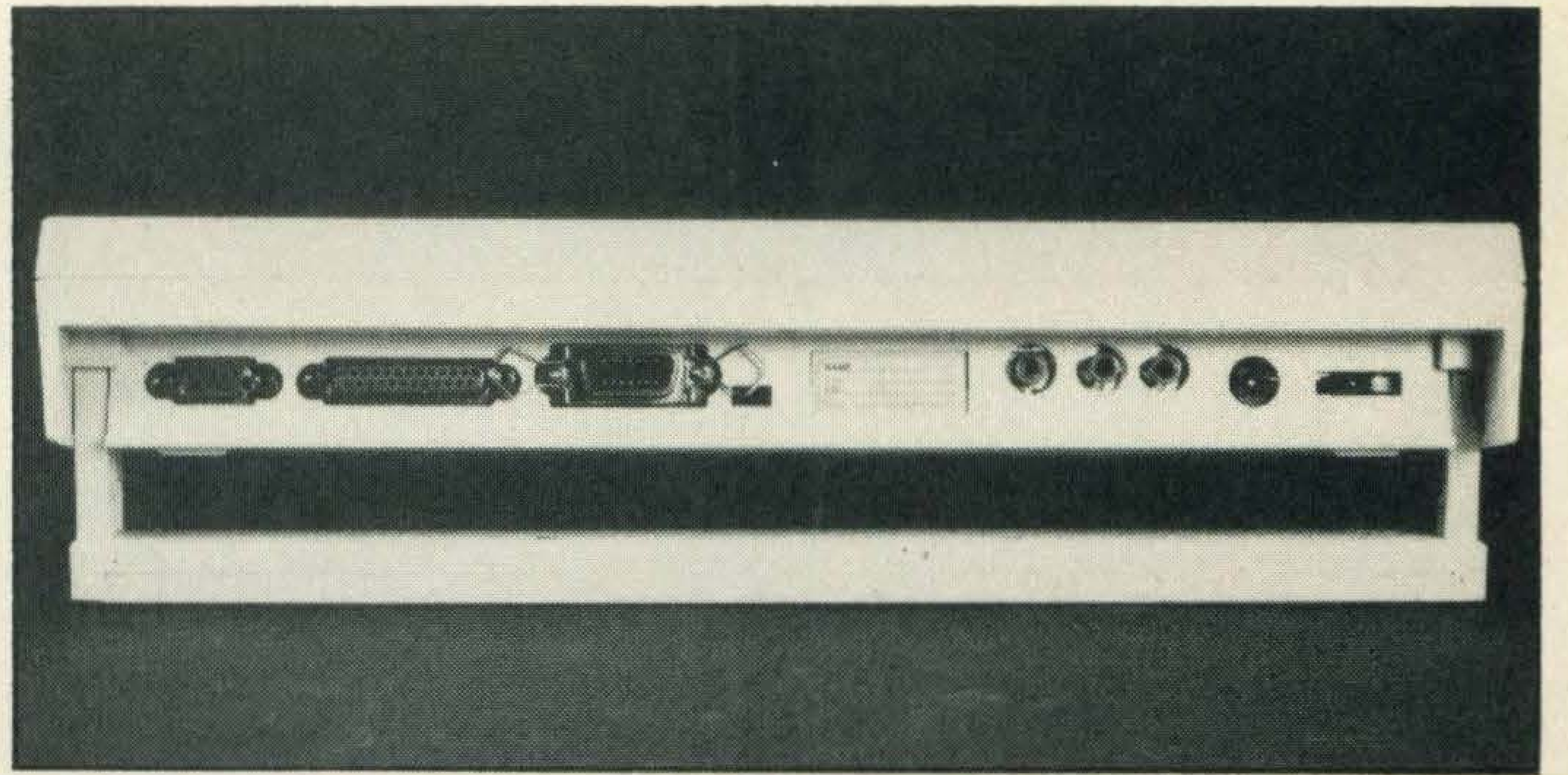
The system disk also contains some software. There is a package of four programs — a very simple database, basic spreadsheet, and a disk management program for, among other things, formatting and copying disks.

None of these programs are up to normal business standards, but they're free and usable. Unfortunately no documentation was supplied for them, so it's impossible to go into the programs in details.

If you decide that you want to get to MSX BASIC from MSX-DOS, you simply type CALL BASIC and you're there. Getting back to MSX-DOS is equally simple. You just type CALL SYSTEM, assuming that you've got the MSX-DOS system disk in the drive.

CP/M is just as easy to use, although the operating system itself is looking a little long in the tooth now. Nevertheless, it's good to have it available as there's so much excellent CP/M software around. Unfortunately, we couldn't really test it because of the lack of an 80


The back view of the machine with the carrying handle folded away


Folding the handle down reveals an impressive array of peripheral ports

column screen on our test machine. Still, we don't envisage any problems.

At the moment there's no information available about the80 column card, so we can't say if the switching between 40 and 80 column modes will be done by hardware (that is with a button) or software. However, the hardware approach seems most likely.

The existence of an 80 column mode does not mean that the X'Press will be compatible with later generations of MSX machines, which will also have 80 columns. Future machines will achieve this by including new video chips, very different to the first-generation chip used in the X'Press. But having 80 columns is essential for running many business programs, particularly CP/M ones.

LIKES

Built-in disk drive

RS232 serial port

80 column screen option

Neat and compact

As the X'Press has so many features it needs good back-up in the form of instructions and general documentation. Fortunately, that's precisely what it's got.

MSX-DOS, CP/M and MSX disk BASIC each have their own manuals. The style is the same throughout, with clear presentation, full explanations of all commands and useful tables and reference sections. In addition, there is a handy CP/M quick reference card, for when you don't want to plough through the manual to find the syntax of the one command you need.

SPECTRAVIDEO X'PRESS
£399 approx

SPECIFICATION



CPU	Z80A equivalent (3.6MHz clock)
MEMORY	
RAM	32K
ROM	32K MSX BASIC
VIDEO RAM	16K
KEYBOARD	
TYPE	Full travel
KEYS	48 Alphanumeric 21 control keys Cursor keypad
NUMERIC KEYPAD	No
VIDEO DISPLAY	
TEXT	Standard MSX modes (40 cols × 24 lines) Plus 80 column mode
GRAPHICS	256 × 192 resolution
COLOURS	16
SPRITES	32
OUTPUTS	RF (TV) Composite monitor
SOUND	
GENERATOR	3 channels with 8 octave range
OUTPUTS	Mono audio output (RCA phono) 150mV/10kOhm
INTERFACES	
JOYSTICKS	2
EXPANSION BUS	No
CARTRIDGE PORT	1
PRINTER	1 Centronics
SERIAL PORT	RS232
CASSETTE	8-pin DIN
DISK	For one external drive
MASS STORAGE	One built-in 3.5inch single sided disk drive. Max capacity 360K
RESET	No
POWER SUPPLY	External transformer
DIMENSIONS	365 × 295 × 60mm (W × D × H)
FINISH	Cream plastic casing and cream keys
SOFTWARE INCLUDED	MSX-DOS system disk CP/M 2.2 system disk both with utilities
SUPPLIED ACCESSORIES	RF cable CP/M manual MSX-DOS manual MSX disk BASIC manual MSX BASIC manual Computer manual
DISTRIBUTOR	Spectravideo Ltd, 165 Garth Road, Morden, Surrey SM4 4LH Tel: 01-3300101

You also get an MSX BASIC manual and a machine instruction book.

Both of these were at the raw copy stage when we saw them, but nevertheless they seem very comprehensive. So there's no problem at all in finding out what you need to know about the micro.

DISLIKES

No reset switch

Cramped keyboard

Not available yet

All in all, it's an impressive package. Even without the MSX compatibility, the X'Press would be an extremely attractive proposition, and Spectravideo may well sell the machine on its individual merits, rather than its place in the big MSX family. But being able to run MSX software, and connect MSX peripherals is obviously going to be a big bonus.

The 80 column screen, CP/M compatibility and built-in disk drive make it an ideal machine for the lower end of the business market, while it should still be cheap enough to appeal to the average home micro user.

Verdict

The only problem we can see with the X'Press is getting hold of it. There are no fixed dates for importing it yet, and certainly no official price. And the fact that it's essentially a first generation MSX micro might put some retailers off stocking it. That would be a shame because, by any standards, it's an excellent, versatile micro—certainly one of the best bargains you'll find in the MSX market.

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THE DAY I BOUGHT A MICRO

It can be a problem just getting your new computer out of the box, as Mike Gerrard found out

I was recently browsing in a second-hand shop when I saw a new micro in its cellophane wrapper. I figured that whoever had bought it had been unable to get it out of the wrapping and sold it. No doubt they told everyone that home computers were vastly over-rated.

But it did make me think about the possible pitfalls awaiting the new micro buyer, so for anyone thinking of buying an MSX machine, or on the verge of going out to do so, here's a semi-serious guide to those vital few hours when you and your machine first meet.

If you think we are making a fuss over nothing, that no-one could fail to get a machine up and running in the twinkling of an eye, then you haven't heard some of the stories I've heard over the years, such as the man who phoned Dragon Data to complain that his brand new



Dragon wasn't raising the promised display on his TV screen.

After going through every probable cause of this, the service department had to resort to improbable ones. They then discovered this chap hadn't switched on his TV set, having got the impression from somewhere that micros worked with the TV switched off.

In fact you should do a little thinking before you get to the stage of switching on the TV, or even bringing the computer home. There's nothing more frustrating than getting the machine and not being able to do very much with it.

Make sure you have a cassette recorder with the right jack sockets, one marked EAR and one marked MIC, with an optional third one, REM, governing remote control.

Most people I know who have bought computers, and that includes myself, get so excited by the purchase of the actual machine that they don't think to buy some software to go along with it. This usually comes afterwards, but it makes far more sense to get some beforehand.

Computers do mostly come with a demonstration tape, but these can hardly be described as state-of-the-art programming. They're usually a collection of very simple programs to ease you into using the machine, and never show off the graphics and sound in a way that a good game will. Don't ignore that introductory tape, but have something more flashy standing by if you don't want family and friends to greet your new wonder purchase with a severe attack of the yawns.

Your machine will also come with a manual, but these do vary from the excellent to the execrable, so look through the book reviews in our sister magazine, *MSX Computing*, and our round-up on page 84, and try to get hold of at least one or two to supplement the manual.

When you get the computer home, staggering under the weight of the extra books and games you've bought with it, you'll probably be too weak to cope with the sturdy packaging so go and have a cup of tea.

The machine should be well protected in styrofoam, even though they are quite robust objects. This doesn't mean you can go throwing them round the room, and if there's an ominous rattle as you're unpacking the box then be prepared for the worst.

A computer comes in one piece, and if yours doesn't then don't waste time looking for the assembly instructions, it isn't an Airfix kit; take it straight back to the shop.

Assuming it is in one piece, then simply put the plug onto the power lead and plug it in. No need to switch on yet as you have to connect up the TV or monitor first.

You could try it without, and in fact the computer will work away quite happily, will play its way through a whole session of your favourite game, if you like, but that's not much good to you if you can't actually see what's going on. You can ask it the square root of 1,000,001 on the keyboard, but you can't see the answer without giving the micro a screen to display it on.

Your manual will explain how everything connects up, so follow those instructions and plug one end of the TV lead into the appropriate socket of your computer, and the other end into the TV aerial socket. You will not, of course, be one of those wallies that forgets to switch on the TV. Now you can switch on the computer.

Assuming your computer has a little red power on/off light, there are now two options. Either the light comes on or it doesn't. If it doesn't, then power is not getting to the computer, which means that perhaps the fuse in the plug has gone, perhaps you've forgotten to pay the bill, or perhaps you've connected the plug up wrongly, though it's usually possible to detect when this has happened because of the explosion.

If you're sure the fuse is working, the plug is working, the socket is working and the wiring is correct, *and* that you're not in the middle of a power cut, then you'd better try tuning in the computer anyway as there's always an outside chance that it's the little red light that's broken.



It all looks so easy in the shop — surely even an idiot can do it?

Tuning into the TV is simple enough. If you have the type that has just the single tuning dial, which you turn to get the different stations, then just keep turning until you get an unfamiliar screen which is obviously not Ceefax, Prestel or even the little girl on the BBC test-screen.

The computer tunes into somewhere near channel 36, if your dial is marked, and if it isn't then the order the channels appear in is ITV/BBC-1/Channel 4/BBC-2/computer, with the computer channel not being very far after BBC-2.

If you have a push-button set then allocate one of the buttons exclusively to the computer to save re-tuning every time. If you have a monitor the signal's direct and doesn't need tuning.

The advantage of a monitor is that you get clearer definition when used with a computer, the disadvantage is that you can't also watch *Minder* on it.

If everything's turned on, connected up and tuned in, then it should be all systems go. If nothing's happening then make sure you're not trying to tune in the microwave by mistake. MSX can't do that . . . yet. If you can't pick up the micro's introductory screen, but your TV you know to be working, then something may be seriously wrong. Is the lead firmly pushed into the aerial socket? Is the other end firmly pushed into the RF socket? Are you *sure* you've not switched on the microwave by mistake?

If you have got the introductory screen, then you can start tapping away on the keyboard to your heart's content. Then you'll want to connect up to the cassette recorder. Right . . . one end of the lead in the cassette socket on the computer, the end with three jack plugs into the cassette recorder, black jack in REM, white jack in EAR, red jack in MIC.

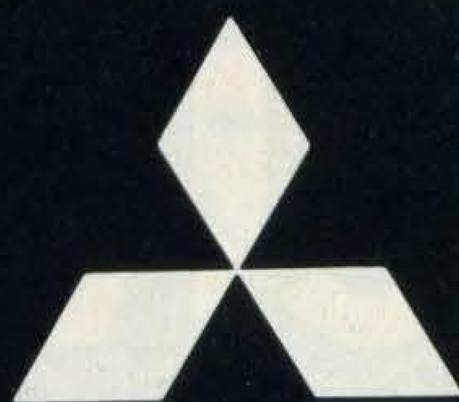
Turn the volume up quite loud, and make sure that the EAR connection is firmly in place or you'll hear something that makes heavy metal sound positively light. Follow the cassette's loading instructions, and chances are it will load.

If the computer screen says I/O ERROR then the volume on the cassette is not quite at the right level, so experiment with that — you'll have to start from the beginning each time. If nothing happens then you've probably typed in the loading command incorrectly. Check you've every colon, capital letter and space in place.

Only if you're absolutely certain you've done everything perfectly (and check things twice if not three times because computers are fussy), then take the tape back to the shop and see if it will load on another MSX computer. If it does, then it should load on yours. There may be a fault in your computer, but it's a very slim chance and the fault more likely lies with you.

If you have none of these problems, and chances are you won't then now you're up, up and away, your MSX yours to command. And if you've had *all* of these problems then all I can say is that you should never have taken the cellophane off the box . . . you and machines obviously just don't get on. Have you thought of taking up knitting? ■

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THE NEW RELEASES



Three new disk systems add up to more choice for MSX users

Many of the popular 'serious' uses for a home computer, such as word processing, accounting, and databases are unwieldy and often impractical if you have to rely on a data recorder for storage.

It is frustrating to sit for five or ten minutes, twiddling your thumbs, waiting for a program or data to load.

The answer to the tedium is, of course, to buy yourself a flexible friend to allow you access to your programs in seconds — namely a floppy disk drive.

Unfortunately, Sony and Spectravideo have been the only MSX manufacturers to offer disk drives to date. In the latter case it's built into the company's yet-to-be-released X'Press micro. However, Toshiba, JVC and Mitsubishi are set to broaden the range with the introduction of three new disk systems this autumn.

Like the Sony drive, they have all elected to use the robust 3.5inch disk format, which has numerous advantages over the older 5.25inch and 8inch disks.

Not least of these is the rigid casing which protects the delicate recording medium. This prevents what may be called the 'origami' syndrome of some computer users — that is, the general bending and folding that a disk is likely to meet when carried from A to B in jacket pockets, briefcases and the like.

In addition, none of the disk surface need be exposed until the disk is safely placed in the drive. A metal shutter ensures that your data is protected.

These new drives differ from the Spectravideo and Sony units in that they accept disks vertically, not horizontally. As it is virtually impossible to perch a disk drive comfortably on top of most MSX micros, vertical drives are more convenient to use, and take up far less of your valuable desk space.

All these units come in two parts — a controller which plugs into a computer cartridge port, and the unit which contains the disk drive mechanism. A ribbon cable links the two. This snaps on to both drive and controller cartridge, so may easily be replaced if damaged in some way.

Of the three new disk units, the Toshiba HX-F101 is the most compact and arguably

the most stylish. The sober black finish of the casing complements the Toshiba pen plotter and new HX-22 micro beautifully. This unit accepts single-sided, double density disks.

A green lamp indicates that the drive is connected to the mains. Another indicator, a red 'In Use' lamp, lights up when data is being read from or written to the disk. The only control as such on this drive is the grey button used to eject disks from the drive mechanism.

This, and the other drives we looked at, had independent, built-in power supplies. The drive casing is adequately ventilated, and overheating seems very unlikely to become a problem.

Once set up, it becomes clear that the Toshiba drive is more than just a pretty face. Data is stored and retrieved with barely a whisper in response from the drive.

Aside from the 'In Use' indicator, the only sure way to check that the disk is alive and well is to place your ear as close to, or even on the drive casing.

Inserting and ejecting disks from the drive is a very smooth process, which adds to the general impression that this product is of very high quality. Not everything is perfect though, as there is some evidence of cost-cutting.

One example, albeit minor, is the absence of a power-on button. This is perhaps no bad thing, as turning off the disk unit while connected to an operational computer can do all sorts of nasty things.

Dust

The second, but more serious niggle is the lack of a cover over the drive slot to protect the internal mechanism. This leaves the disk read/write heads open to various airborne hazards— like dust. It seems a bit pointless to have the elaborate shutters on the disks themselves while the drive is relatively unprotected.

No manuals were supplied with our review system, so we can only hope that they are up to the same standard as those supplied with the Spectravideo X'Press.

The only software likely to be supplied at present is MSX disk BASIC, which comes in ROM form in the interface cartridge. There are no immediate plans to offer MSX-DOS or CP/M. Toshiba claims that it is waiting until MSX-DOS is finalised before shipping it with the drives.

However, an MSX-DOS disk supplied with the X'Press worked perfectly with the Toshiba drive, as it did with all the MSX drives we tested. Surprisingly, a CP/M 2.2 disk failed to load on anything else but the Spectravideo.

Every time we tried to boot the CP/M system disk on a machine other than the X'Press the machine just hung up. That suggests that the CP/M program makes machine code calls which are non-MSX standard.

At around £350, the same as the Sony drive, the Toshiba HX-101 is very expensive, but with high quality to match. It seems likely that many dealers will offer good discounts, so it is worth shopping around.

In contrast, whereas Toshiba has moved up-market with its new range of products, JVC has made a disappointing downturn with it HC-F303 disk drive. After the elegance and quality of construction evident both on the company's micro and particularly its data recorder, this drive comes quite a few steps behind.

It still looks nice, in the gunmetal grey livery we've come to expect of JVC. It is slightly larger than Toshiba's drive and offers the same amount of storage. The features that were missing on the Toshiba are present here, namely a flap to protect the drive mechanism and a power button. The only indicator lamp is for power.

Using the drive, it becomes apparent why no 'In Use' lamp or equivalent is required. After the blissful silence of the Toshiba drive, the JVC unit makes occasional little 'crunching' noises while it works. It is not excessively noisy — you are just made aware of its presence from time to time.

The insert/eject mechanism feels coarse and rattly and ejecting disks seems to be far more forceful than it needs to be. Many of these criticisms are cosmetic. The drive works perfectly well and is very straightforward in use.

Again, no software or manuals were supplied, but the system is guaranteed to be supplied with MSX disk BASIC, and with MSX-DOS a likely addition.

The Mitsubishi drive we received for review was similarly disadvantaged in the manual and software stakes. The Mitsubishi ML-30FD is an unusual piece of hardware for a number of reasons. It is the largest of the three drives we looked at but that may easily be forgiven when you understand the reason why.

The drive casing may hold up two 3.5inch units side by side. Our review drive had the slot for drive 2 blanked out. Presumably you can pop along to Mitsubishi or a suitable dealer when you want to upgrade your system and have a second drive fitted. A switch on the controller cartridge selects single or double drive operation.

Wedge

The basic model offers approximately twice the storage of the Toshiba or JVC drives, as it allows the use of double-sided double density disks.

The drive casing is not the standard 'bread-tin' shape of the other two — a wedge at the front of the unit tilts the drives to a more convenient working angle for inserting and removing disks.

Overall, this drive had the cheapest feel to it, but this is more than compensated for by the extra storage capacity. And it certainly works very well, being almost as smooth and quiet as the Toshiba.

Prices are as yet unavailable, but Mitsubishi's Steve Wankling confidently expects the price to be 'competitive'. For users who are likely to upgrade to a twin drive system in the near future, the ML-30FD could provide the cheapest solution. If priced at under £400, then Mitsubishi's drive definitely the best buy out of the three.

But should your concern be style, quality and practical good looks rather than mass storage, then Toshiba has produced a disk drive which leaves even the Sony drive — for all its charm — in the doldrums. ■

Suppliers and Prices

Toshiba HX-F101

Price: £349.95 inc VAT

Toshiba (UK) Ltd
Frimley Road, Frimley
Camberley, Surrey
GU16 5JJ

Tel: (0276) 62222

JVC HC-F303

Price: TBA

JVC (UK) Ltd.
Eldonwall Trading Estate
6-8 Priestley Way
Staples Corner
London NW2 7AF

Tel: 01-450 3282

Mitsubishi ML-30FD

Price: TBA

Mitsubishi Electric (UK) Ltd.
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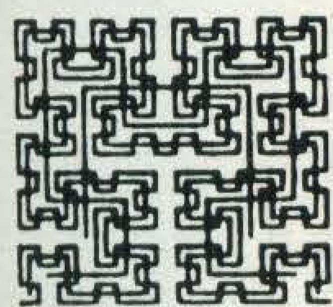
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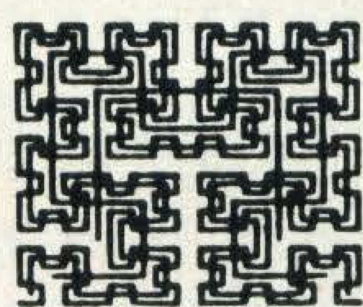
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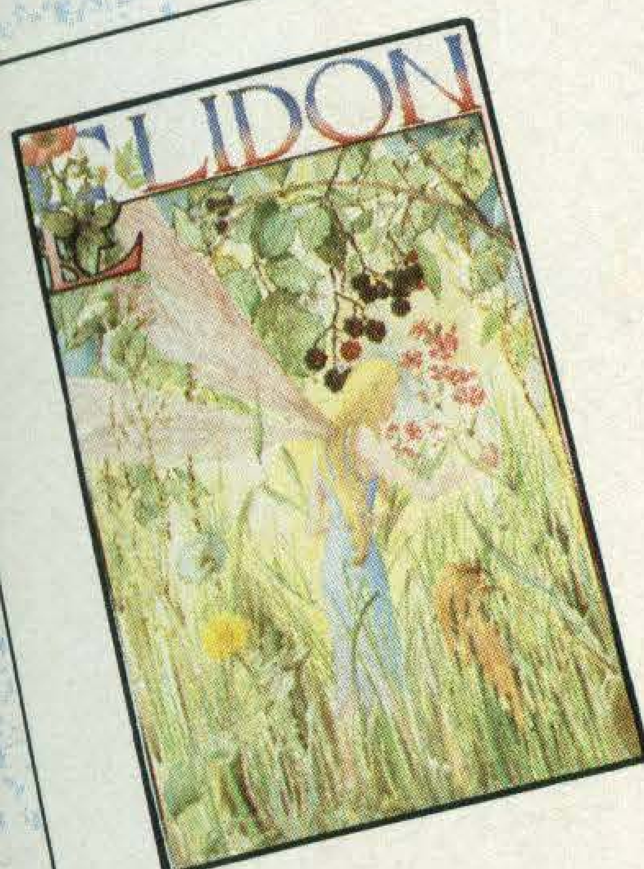
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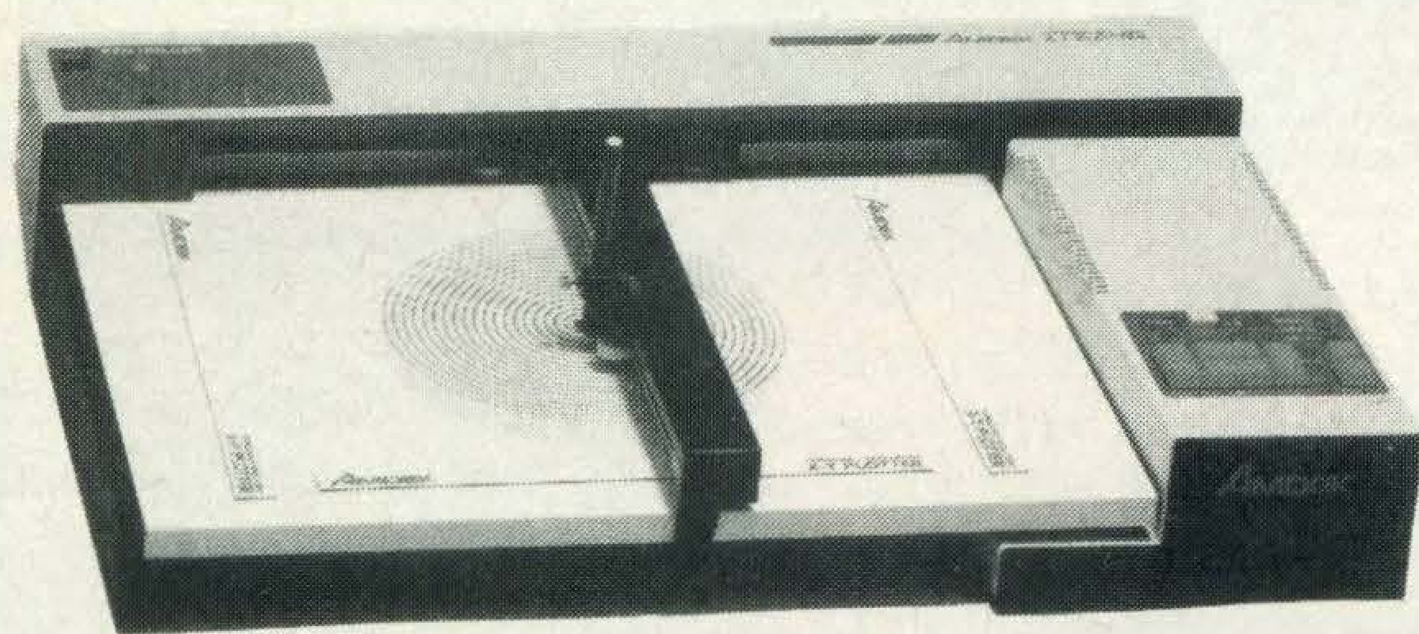
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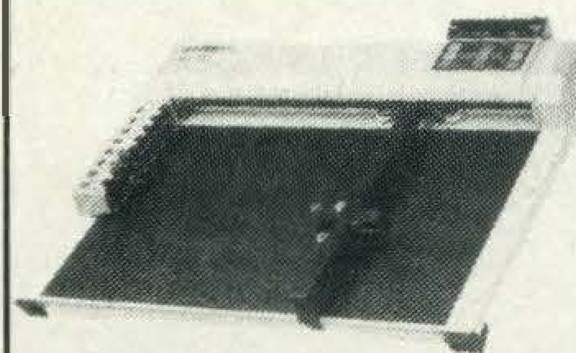
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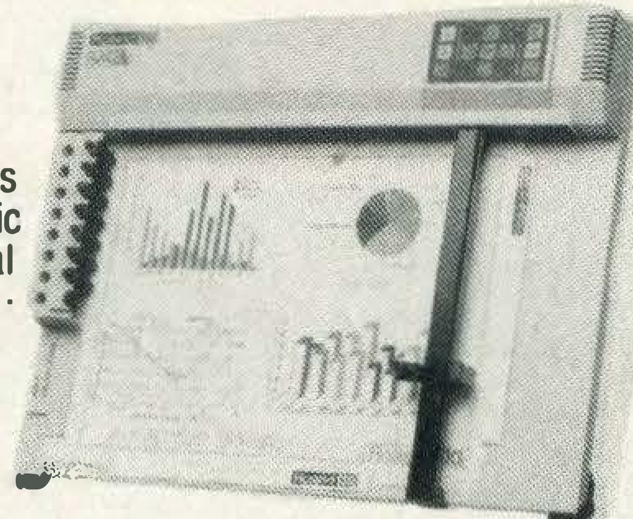
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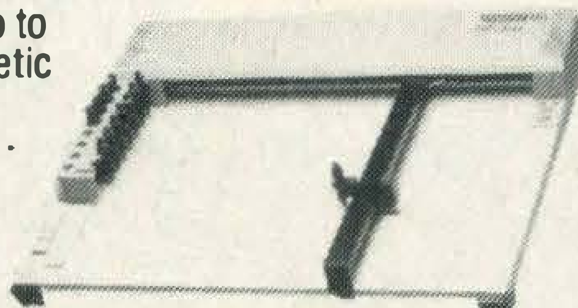
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Everyone has a favourite game. After much debate we've put together a list of what we think are the 20 best games around

Believe it or not, it's a jungle out there. In the office, the mounds of software continue to pile up, even if you sometimes have trouble getting hold of it. But amidst all this confusion there are a few titles which stand out from the crowd.

We've put all the MSX releases through their paces — some unkind people might call it 'playing games', but we prefer to think of it as research. Inevitably a few titles become favourites, staying on our screens longer than most. And we thought you might like to know which programs we like best.

Of course, they're all games. That's not because applications and business programs are of a lower standard, or because of any lack of seriousness on our part. It's simply that the most popular software is always the most entertaining and enjoyable and that means games. So here's 20 of the best.

Before passing comment on the individual games, it's worth pointing out that these titles are simply the office favourites. Even more than other types of software, games are at the mercy of personal preference, or prejudice. Some people go ape about platform-type games, while feeling lost in adventures — and vice versa.

However, nearly everone took a shine to Konami's *Antarctic Adventure*, with its cute, hopping penguin. Around the time that MSX was launched it was the most popular game around. Well, alright, it was the *only* game around.

Fortunately it was a good start for MSX. The game has superb graphics, with a smoothly scrolling 3-D landscape. And, of course, there's the now-famous penguin, leaping over holes and avoiding sea-lions (or seals, or whatever — there's some controversy over this matter).

As it's a cartridge, the game can be run instantly, with none of the delay and possible loading problems you get with tapes. That made it the natural demonstration game for MSX manufacturers wanting to show off their new micros.

Around the time of the launch of MSX, you just couldn't get away from *Antarctic Adventure*. Nevertheless, it still retains a special place in our affections, even if we no longer want to play it.

The one drawback with cartridges is that they cost more. Konami games typically sell for around £16. You might think that's money well spent considering how fast and easy cartridges are to use. And the graphics are invariably excellent. So if you're feeling well-off, here are some more Konami titles we can recommend.

Of course, Konami has a head start. Most of its MSX titles have been converted from coin-slot arcade originals, and so are tried and trusted.

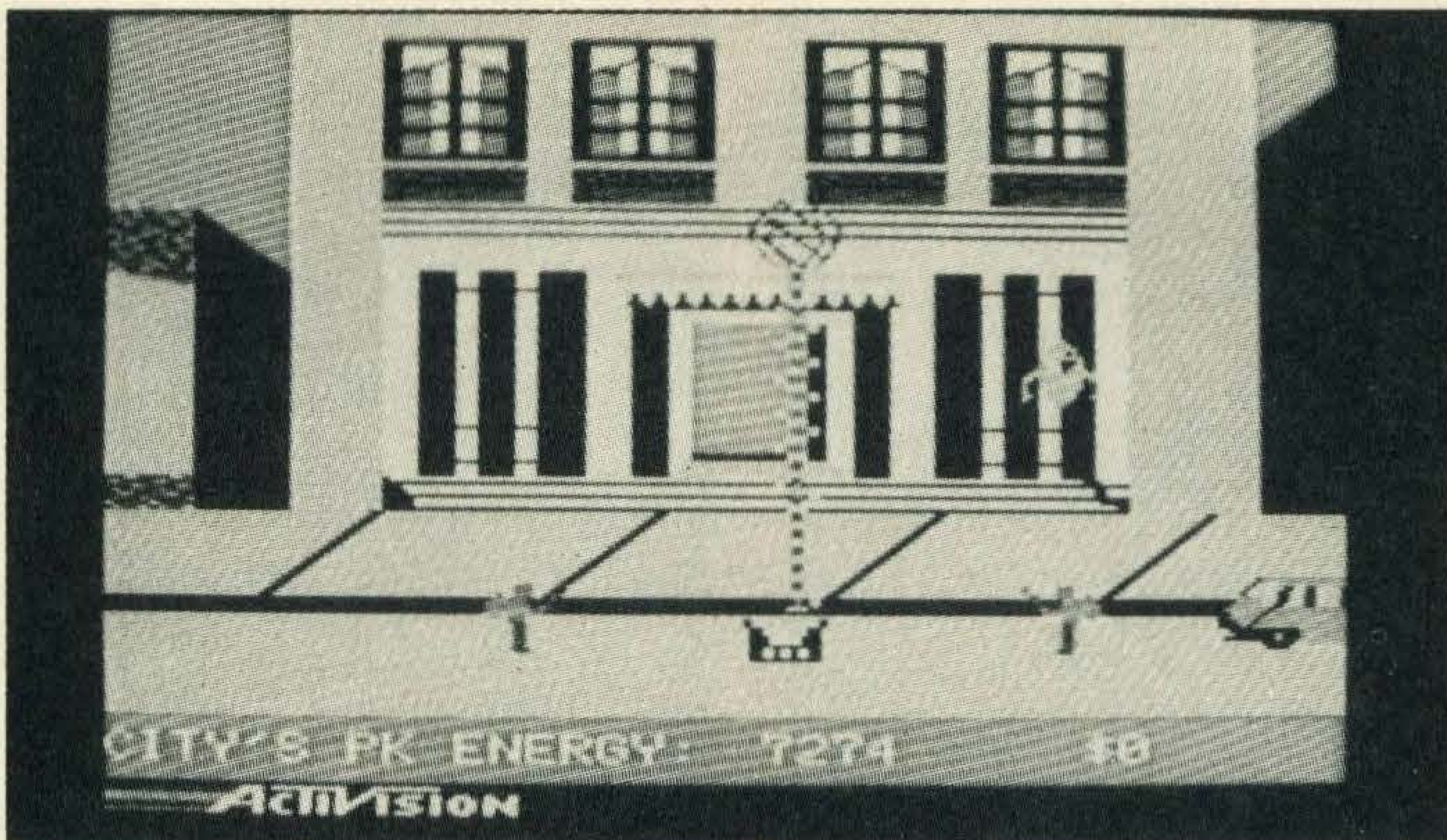
The most notable examples are the athletics games. There are four at the moment — *Hyper Sports* 1 and 2 and *Track and Field* 1 and 2 (previously called, and still subtitled, *Hyper Olympic)*.

In each case the format is the same. There are three or four events, each with a qualifying level which you have to beat. Achieve that, and you go on to the next level — fail, and it's back to the beginning, although you do get three attempts at most events.

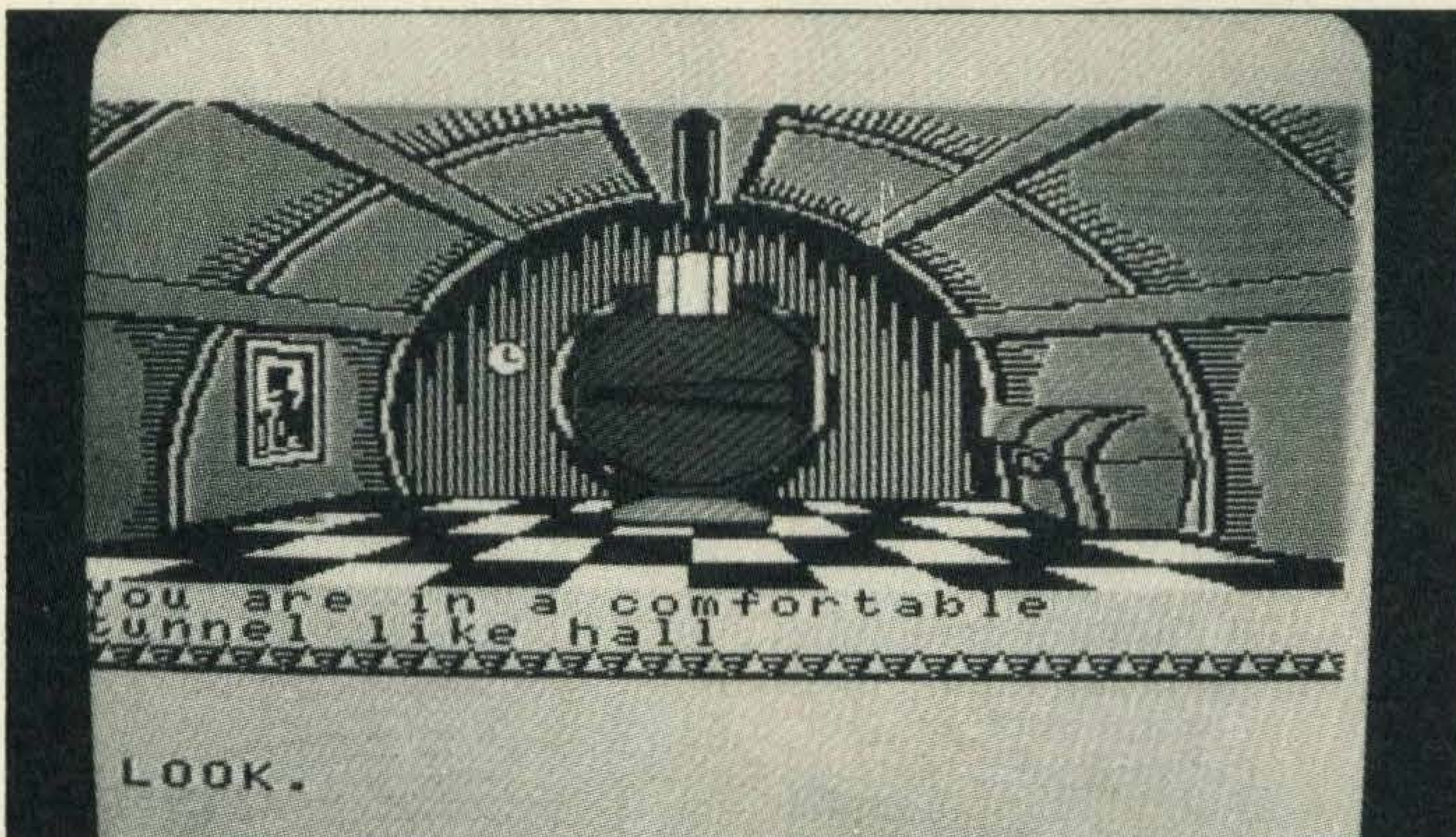
Some of the games involve a lot of keyboard pounding, particularly the running events, while others, such as archery, are down to timing and skill.

All four cartridges have a combination of both. But the one involving the highest amount of skill, and so ultimately the most rewarding, is *Hyper Sports 2,* with skeet shooting, archery and weight lifting.

Some of the events have little surprises in store. For example, in the skeet shooting, if you manage to hit all the clay pigeons, a squid flies across the screen. Hit that with the left barrel and a strange blue bird appears which can be shot several times. None of this is in the instructions — it's left for you to discover, which is a nice touch.



Activision's *Ghostbusters* has superb graphics and sound, and variety



Melbourne House's colourful adventure, *The Hobbit*, features graphics



***Sorcery*, from Virgin combines an adventure with fast arcade action**

Sky Jaguar contains fewer surprises, and the scrolling isn't as smooth as most of the Konami games, but it still created a few addicts in our office.

It's a basic shoot-'em-up game, but with better graphics than most. You move your spaceship around, blasting aliens who appear in a variety of forms from the top of the screen, while an ever-changing landscape scrolls by beneath you.

Unlike most games of this type, you can move backwards and forwards, as well as side to side, and it's certainly one of the better alien-bashing efforts.

In complete contrast, Konami also produces *Tennis.* This involves no deaths whatsoever, alien or otherwise. Unless, of course, you decide to kill your computer because it keeps beating you.

It's a pretty good simulation of women's tennis, where you can play against the computer or another player. If you start winning against the computer it retaliates by playing better.

The game cheats with the rules in few places — you win a set by being the first to six, with none of that two game difference nonsense. But on the whole it's excellent — well worth getting in in time for the next Wimbledon.

Back to more conventional arcade favourites, we have *Super Cobra,* a pretty standard *Scramble*-type game where you fly over mountains in the face of inevitably overwhelming enemies. It's not original, but it's one of the best versions around.

As if killing everything in sight isn't enough, there's also a mission. If you manage to avoid or zap all of the aliens, and refrain from ploughing into the mountains, you get to rescue a box — and then start all over again.

There's also an element of that in *King's Valley.* This is a platform-type game, where you whizz around on several levels, collecting gems, digging through floors and ridding the place of ghosts, or rather mummies.

As you might have guessed from that last comment, the action takes place in a pyramid. The thing is, once you've collected all the gems in one pyramid, there's another one to get through, albeit a little harder.

Should you clear out all the pyramids, your little man does a weird sand dance, and then it's back to the pyramids. It sounds simple, but this is possibly one of the most enjoyable games Konami produces.

The only other game on cartridge in our selection is *Super Snake,* from HAL. This is slightly cheaper than the Konami cartridges, at around £13.50, although that's still quite a lot to pay for a game.

It's not exactly the most sophisticated program, but that could be its strongest point. The idea is simply that you guide a snake around inside a rectangle, eating up points and assorted fruits, with the snake getting longer each time it dines.

Of course, you have to avoid eating yourself, and also stay out of the way of some nasty creatures. It's an idea that's been around for a long time, and this is a good version of it.

But although it may sound a bit too basic for you, its lack of complexity will appeal to younger children, as well as those of us who enjoy a few hours of mindless entertainment.

The rest of our selection is on cassette — a more tedious and fault-prone medium to use, but much cheaper.

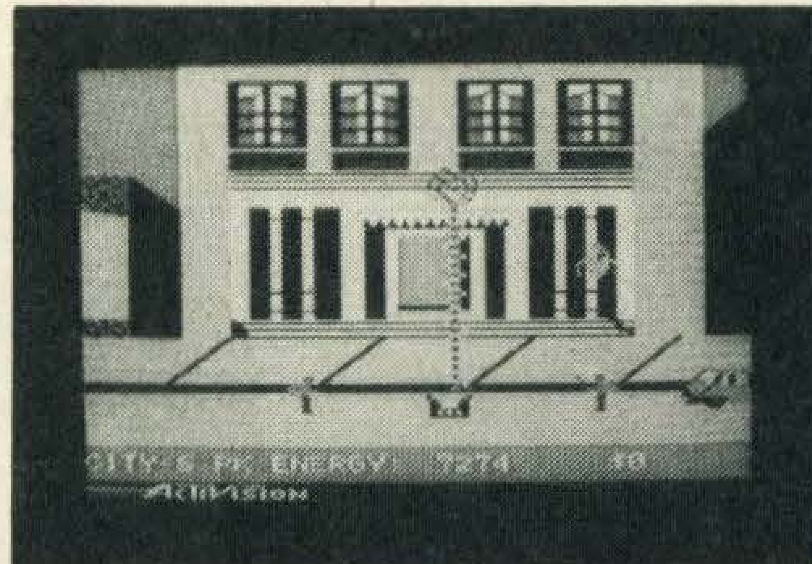
That last point is particularly true in the case of Mastertronic, which is renowned for producing low-price software. But that doesn't mean that the quality has to be equally low.

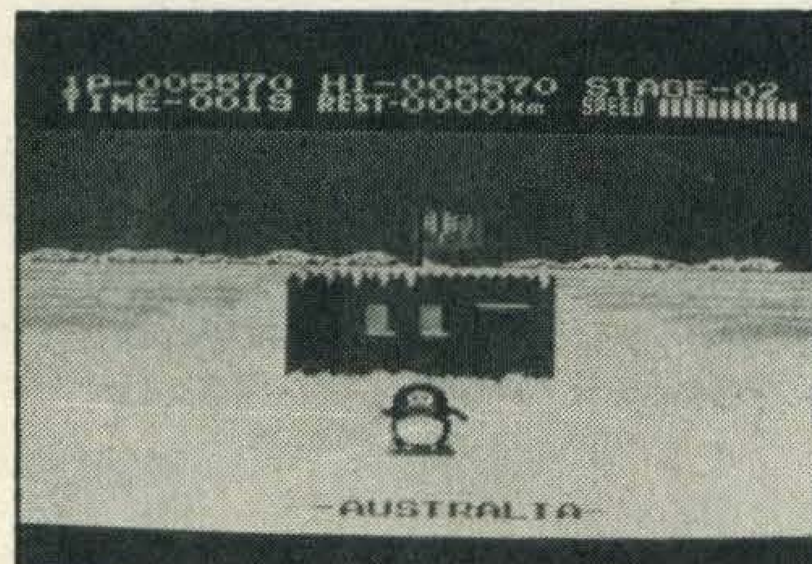
Finders Keepers is not only remarkably good value, at £1.99, it's also a very good game. The format is the familiar multi-screen platform type, with you dashing around a castle, picking up objects and avoiding enemies.

The graphics are excellent, the sound is amusing and the

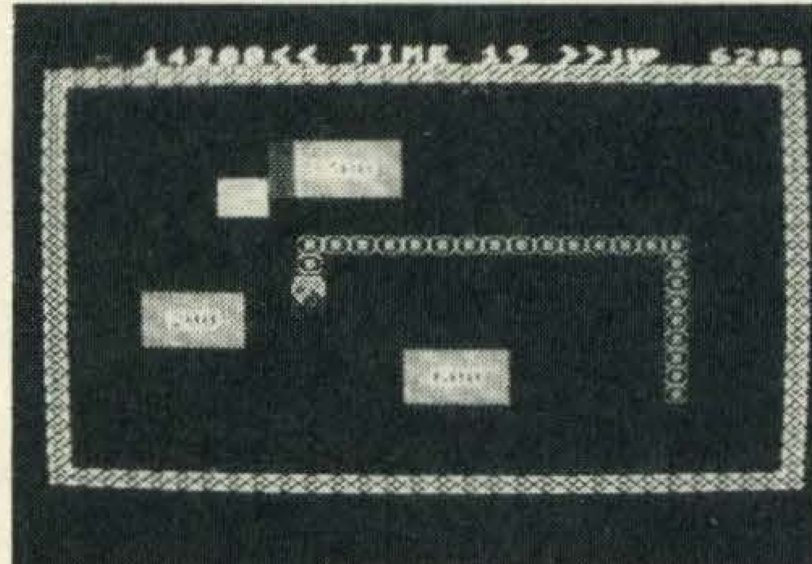


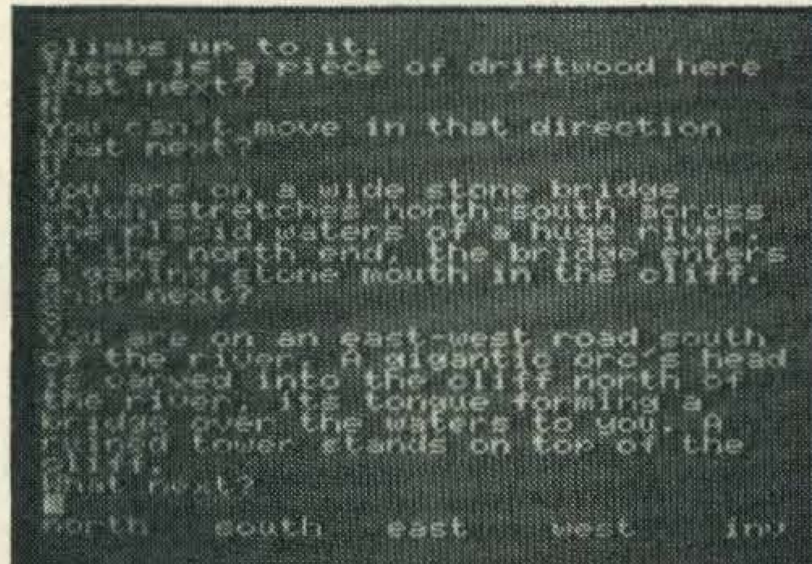
TOP 20

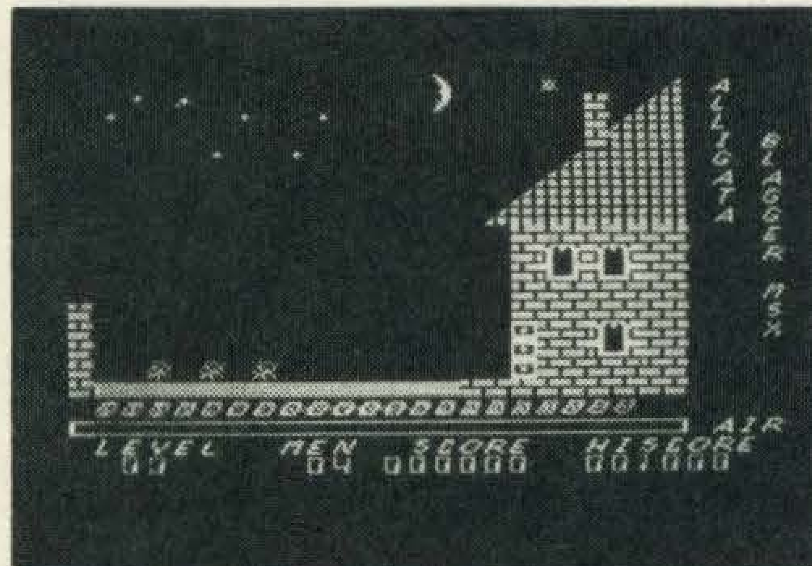

More action from *Ghostbusters*

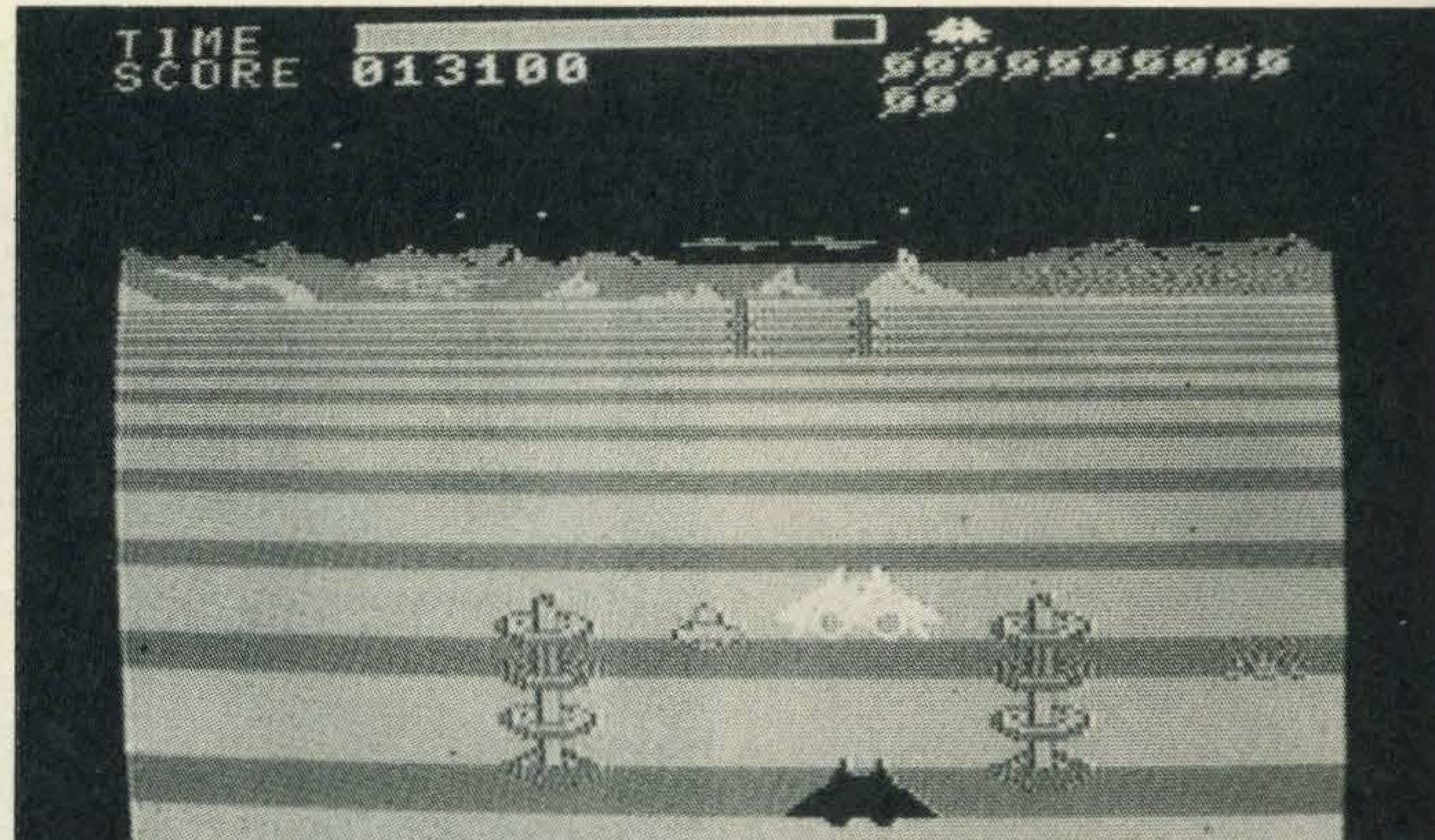


The penguin in *Antarctic Adventure*

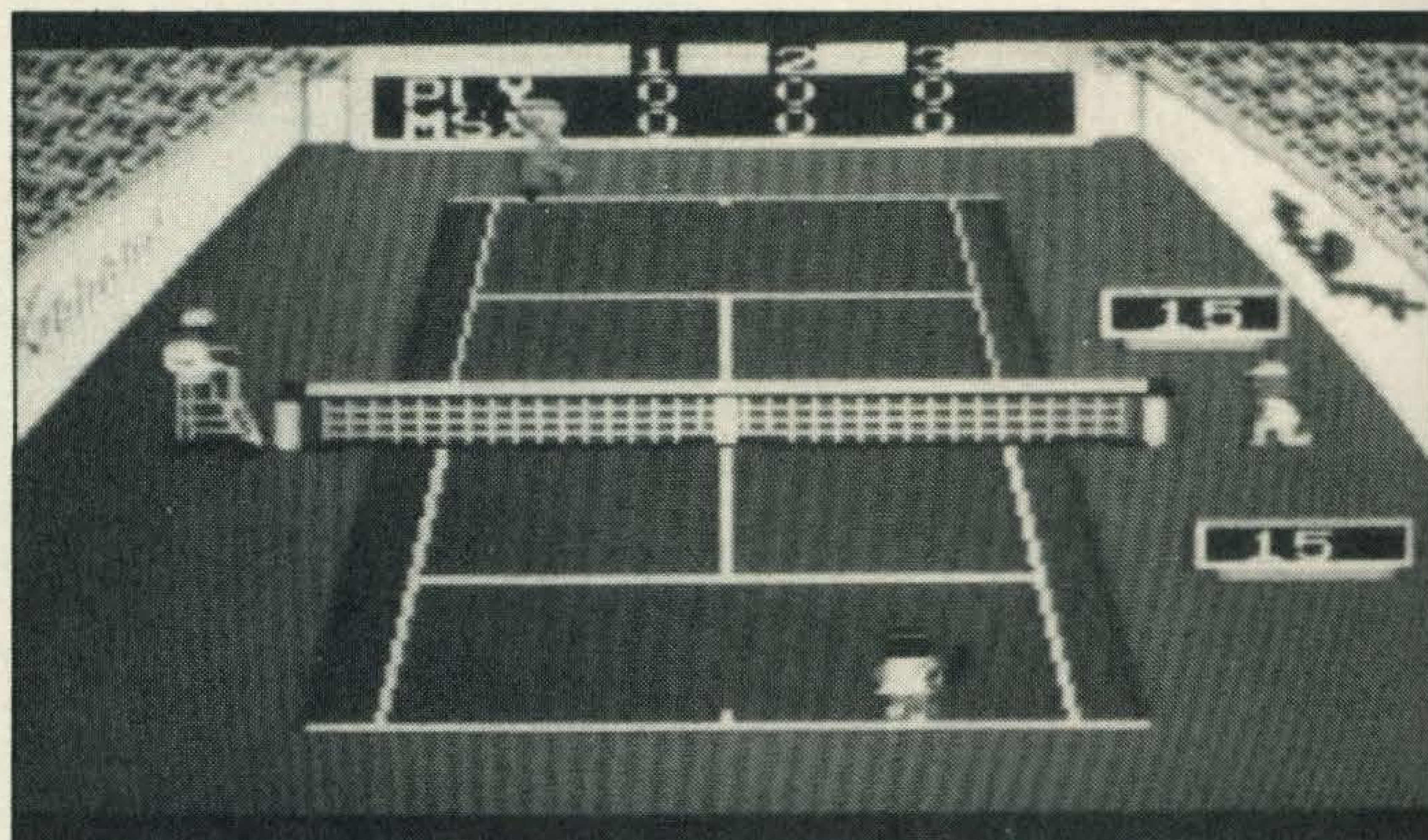

HAL's *Super Snake* in full slither


Text from *Dungeon Adventure*

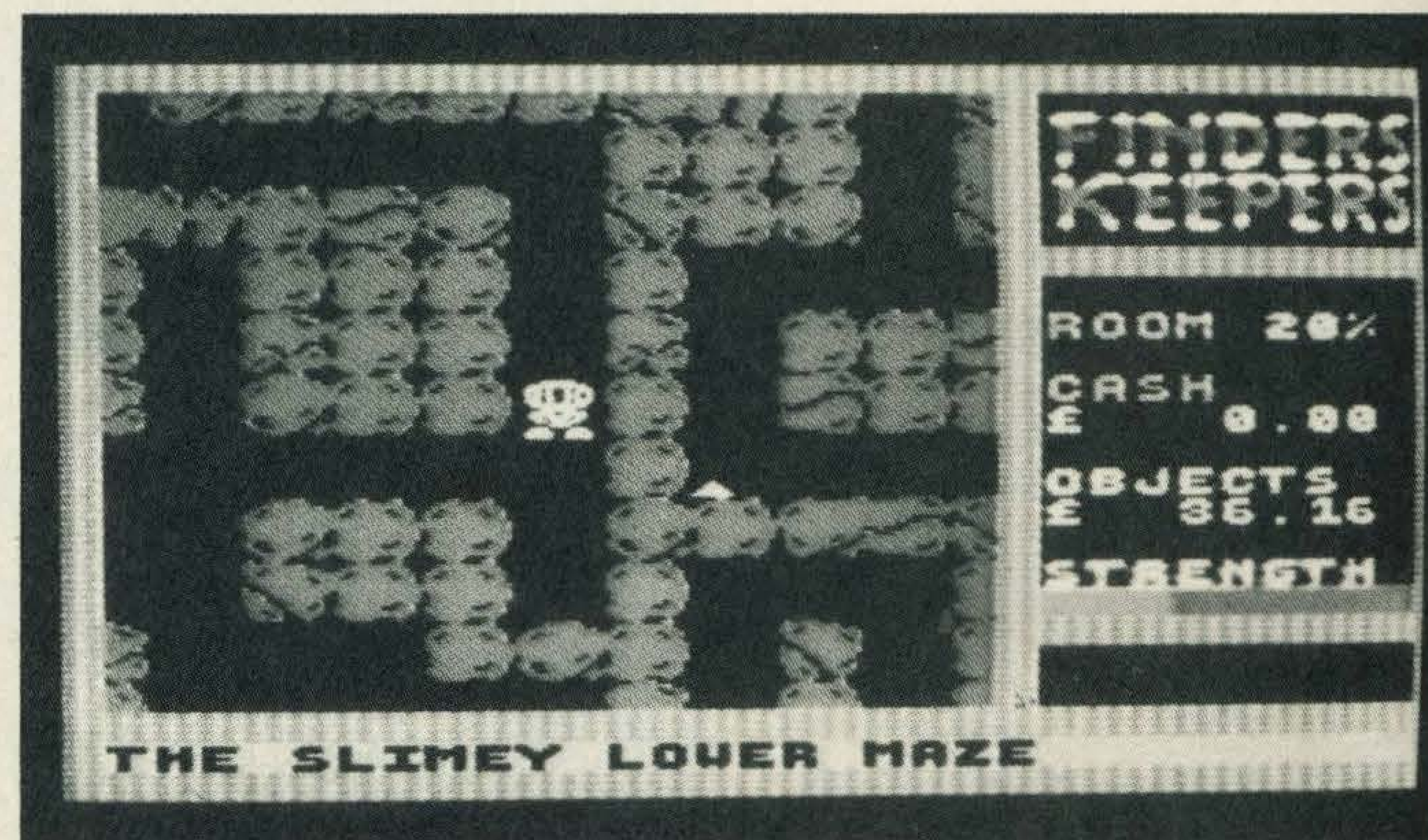

A robbed house in *Blagger*



Dodge the pylons and zap the aliens in Electric's version of *Buck Rogers*



Konami has an excellent version of tennis called — wait for it — *Tennis*



Cut price quality— Mastertronic's *Finders Keepers* is superb value

enemies are especially mean. Mind you, mean enemies are pretty common in computer games.

Zaxxon and *Buck Rogers*, distributed by Electric, have their fair share of homicidal aliens. Both titles sell at around £10, and are fairly faithful reproductions of arcade classics.

Graphics are the strong point here, with 3-D effects. In the case of *Zaxxon* you get a slightly side-on view, or, to be more technical, the graphics use isometric projection.

There's enough variation in the games to keep you interested, with alternate bouts on the surface of the planet and in deep space. And there are enough differences between the games to make it worth buying both.

Some of the games which have appeared for MSX have very familiar titles. That's because they became famous on other micros, and have since been converted to MSX.

The next bunch are good examples of this. *Manic Miner*, (Software Projects, £7), for example, is one of the original platform-type arcade games, although *Blagger* (Alligata, around £7) has improved on it in terms of complexity and graphics.

And then, of course, there's *Chuckie Egg* (A&F, £7) which kept the whole of this office hooked for weeks. You might think that once you've seen one platform game you've seen them all. But each of these games has its own personality.

Manic Miner has the feel of a classic. *Chuckie Egg* has some of the cutest birds around, and *Blagger* needs a calculating mind as well as a quick wrist.

But if you're a real speed addict then the game for you is *Boulderdash*. This is like a platform game without platforms. You dash around underground picking up gems and trying to avoid being turned into an electronic pancake by falling rocks.

The speed at which you have to move can be quite terrifying. Fortunately the graphics, and user controls, are up to it. If you've a strong heart and nimble fingers you'll find it one of the most exciting games available. At about £6 in the shops, Orpheus definitely has a winner with this program.

The last classic arcade conversion in our selection is *Beamrider* from Activision. It's also one of the simpler games — basic, 3-D alien-zapping action.

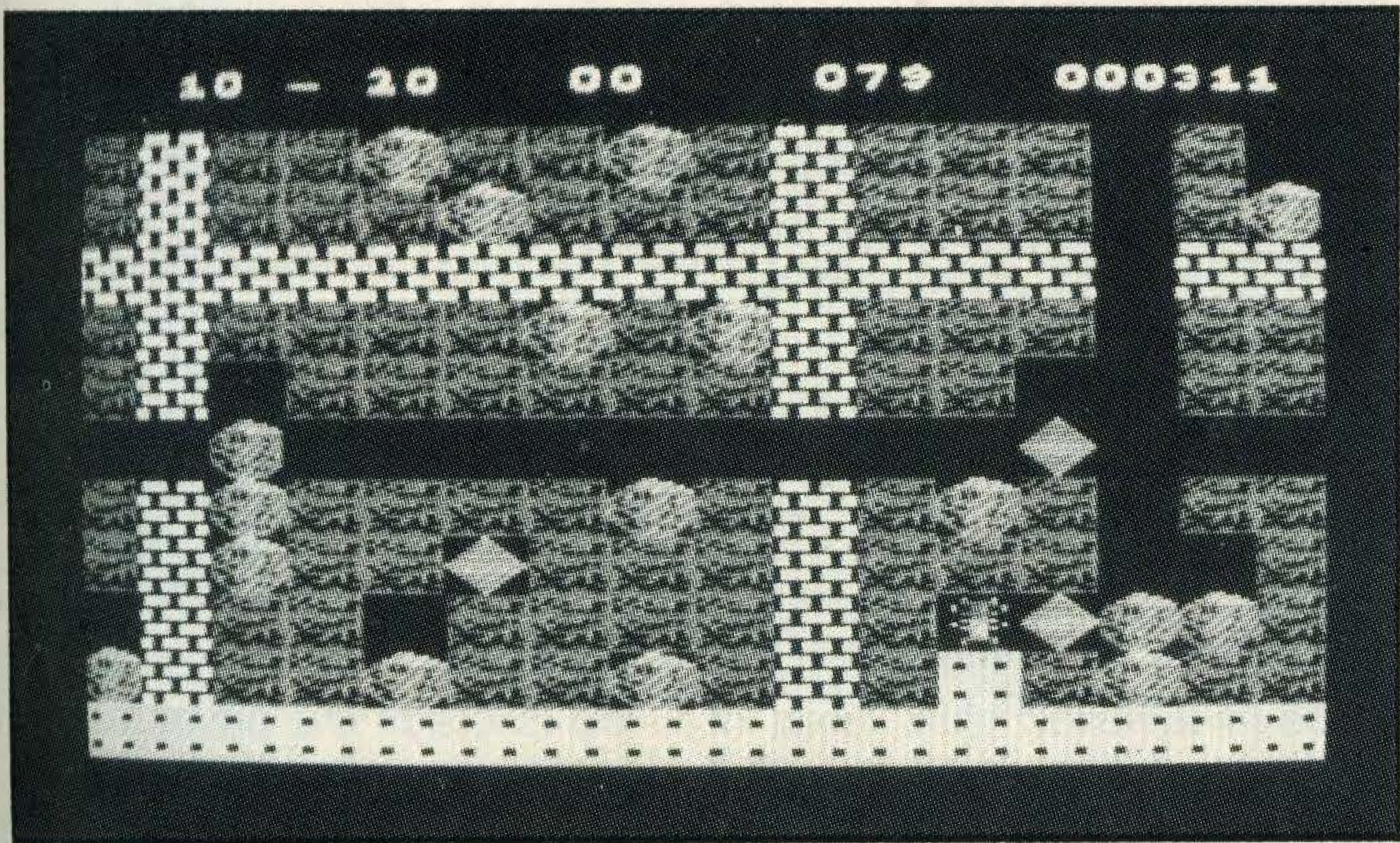
The graphics aren't particularly detailed — contrary to the main trend in computer games. But they are bright and extremely effective, especially the grid which rushes towards you as you fly along in your spaceship.

In a sense, it's something of a throwback to the days when the only computer games were played on dedicated games consoles, of the type produced by Atari. But *Beamrider* can still produce that rush of adrenalin, the sweat-soaked brow and nervous look which distinguish the hardened games player. Mind you, at around £11 it's somewhat over-priced.

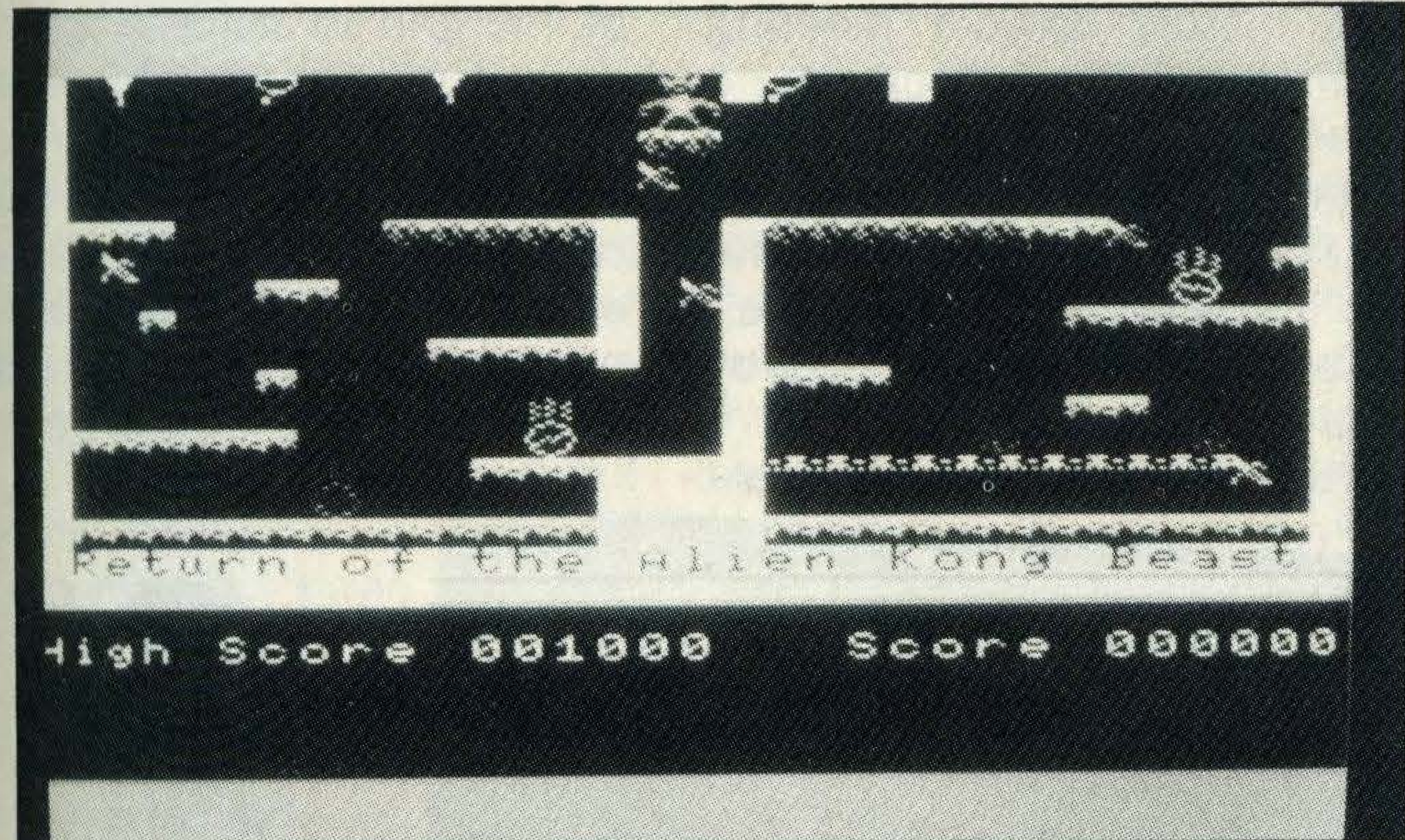
That's certainly not true of our last two arcade games. There are some people in this office who feel that *Sorcery* could never be over-priced, whatever the cost.

It's an intriguing combination of arcade action and adventure. Not only do you have to fend off nasty creatures in a vast variety of beautifully drawn locations, but you also have to collect objects whose functions in the game are not always immediately obvious.

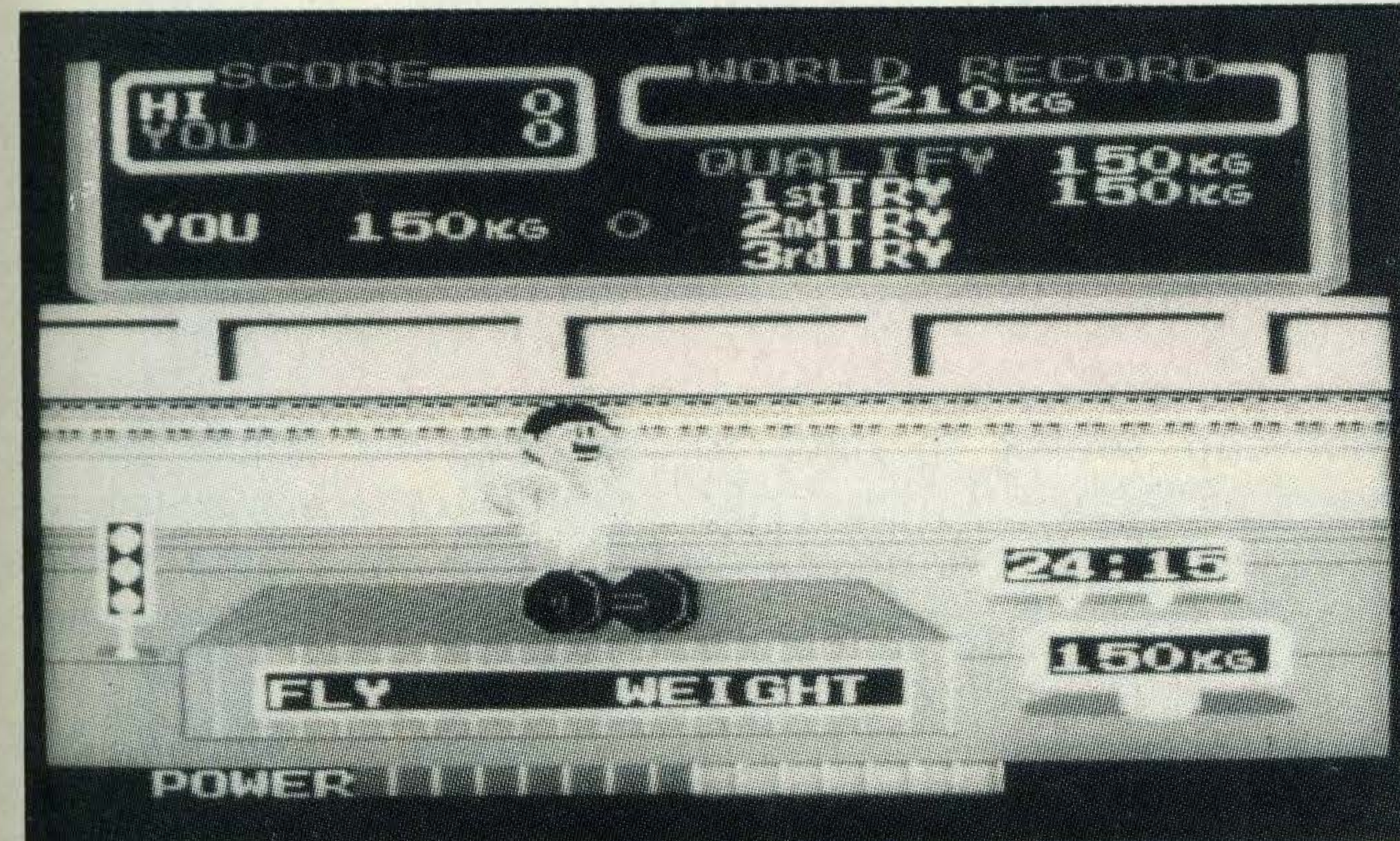
One of the best features is that much of the game goes unexplained in the instructions. You simply have to sort it



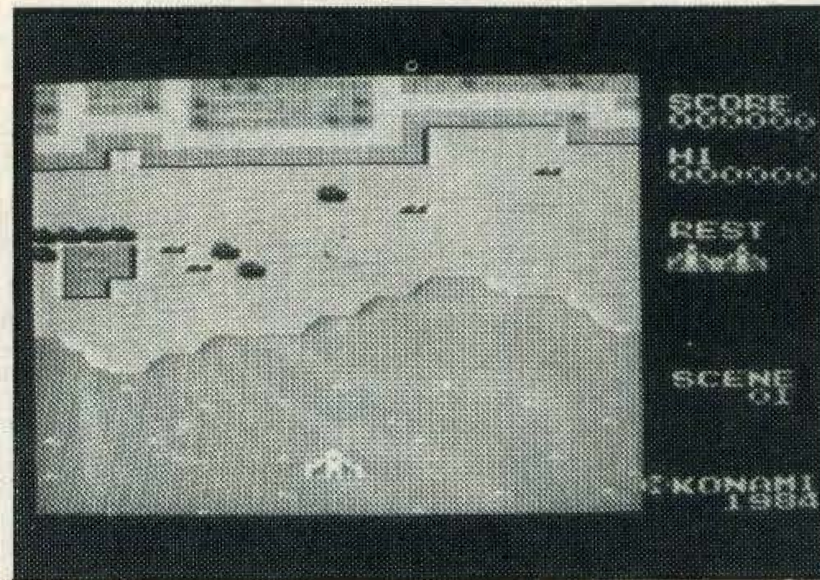
Wear down those fingertips with *Boulderdash* from Orpheus



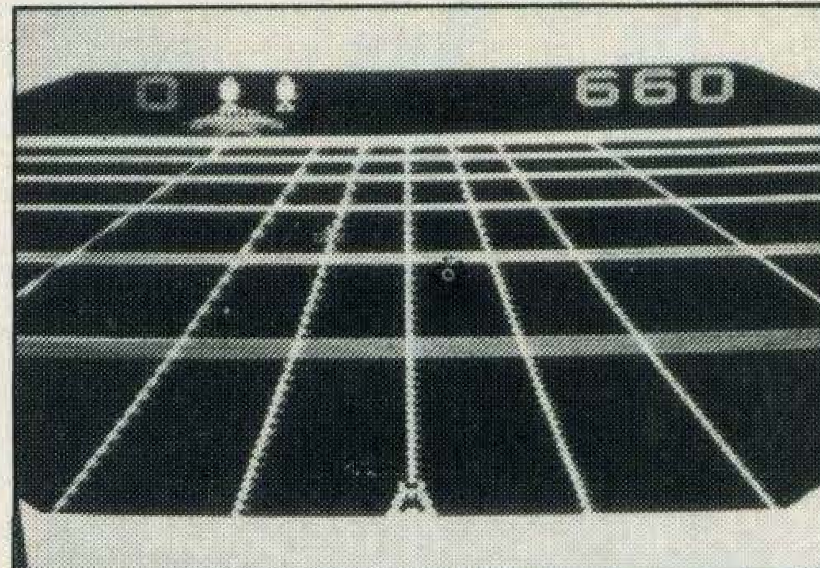
An excellent example of a good conversion — *Manic Miner*



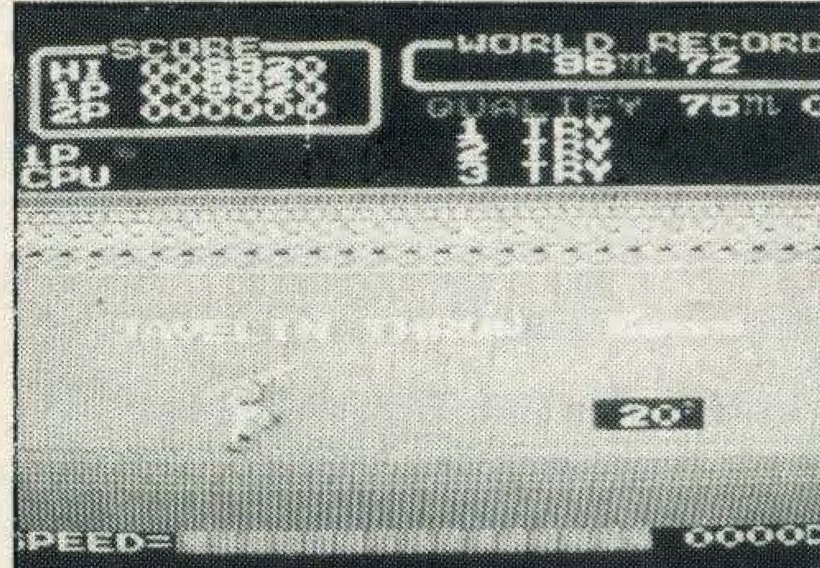
The final event in *Hyper Sports 2* by cartridge kings Konami



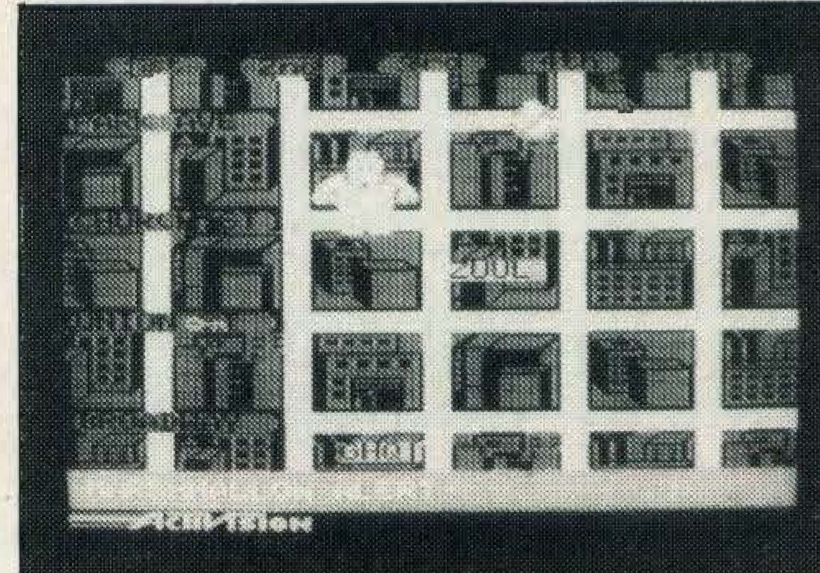
Sky Jaguar prepares for battle

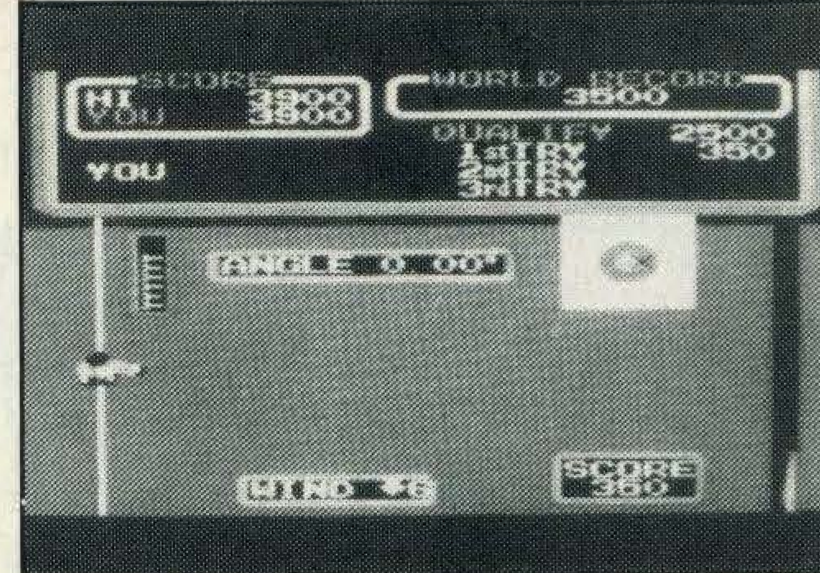


Riding the beams in *Beamrider*



Track and Field makes its point


Ghostbusters marshmallow



Shooting to win in *Hyper Sport 2*



out for yourself.

Things happen fast, and it's crucial to be able to keep track of where you are, and where you've been. The object is to rescue a number of fellow sorcerers. So, as in an adventure, it's important to be able to find your way around.

With *Ghostbusters*, speed is of the essence. You have to dash around, ridding New York of assorted ghouls, to avoid the Marshmallow Man doing all sorts of damage.

This game suffered a lot from advance hype, which led people to expect more than they actually got. But the graphics are very good, it makes the most of MSX sound, with the *Ghostbusters* theme playing constantly in the background, and the concept is highly imaginative. Activision has given it an above-average price of around £11, but it's worth it.

Finally, although we've generally confined ourselves to arcade action, we felt we had to mention a few adventures. After all, adventure games are almost as old as computers themselves.

The real classic type of adventure is well represented by Level 9's *Dungeon Adventure*. It's a text-only game. But what it lacks in prettiness it makes up for in mind bending complexity.

It features imaginatively horrible creatures — like carnivorous jelly and armed skeletons — and ingenious puzzles. It costs about £9 but should keep you entranced for weeks.

The same company also produces *Emerald Isle*. It's perhaps not quite as complex, but if things are going badly, and you've just been killed for the tenth time, at least you can be cheered up by the pictures, as each location has its own graphics.

The pictures do take a while to draw. But if you find them slowing you down you can always turn off the graphics and revert to text only.

The Hobbit also has pretty pictures. But here the main feature is the language. Quite complex sentences can be entered and the program will still understand them.

And there are those wonderful characters which every reader of the book (supplied with the program) will come to love. What's more, they're not mere passive bystanders. They are all wilful beings who'll wander off and do their own things while waiting for you to take some action.

Produced by Melbourne House, for around £14, *The Hobbit* is one of the most entertaining adventures you'll find.

And that's about it. You probably won't agree with our selection — we had trouble agreeing on it ourselves. But it should give you an idea of the range and quality of MSX software. ■

The prices quoted in the text are typical of the prices being charged in the shops. Official recommended retail prices are typically one or two pounds higher. For more information about stockists, and so on, contact the manufacturers and distributors on these numbers:

A&F	(0706) 341111
Activision	01-486 7588
Alligata	(0742) 755796
Electric	(0954) 81991
HAL	(04243) 5840
Konami	01-429 2446
Level 9	(0494) 26871
Mastertronic	01-402 3316
Melbourne House	01-940 6064
Orpheus	(0767) 51481
Software Projects	051-428 9393
Virgin	01-727 8070

SOFT SPOT

The software flood continues as manufacturers churn out a steady stream of MSX titles. There's something for everyone — from arcade games to educational programs. The cartridge is still king when it comes to quality, at least as far as games are concerned. But we're also starting to see very inexpensive, but high quality cassette-based software. We've picked out a representative selection of the recent releases and put them through their paces, emerging bog-eyed and bleary to give you our thoughts. But remember, it's always best to try out a program for yourself before parting with the hard-earned readies!

The Wreck — by Electric Software

Electric's latest title is an adventure based on a shipwreck. But it's an adventure with a difference.

For a start it's three dimensional, and furthermore there's no text — it's purely graphics.

Each copy of the game is supplied with a manual and a special location grid, both of which are essential reading before you start your journey.

The manual provides a potted history of your meeting with a drunk in a bar (where else!) which ends up with the pair of you collaborating.

Your goal is to collect the bullion which has been hidden in a safe on the bottom deck by the ship's captain.

The game is extremely complex as each deck appears in the form of a maze with clues placed at strategic points.

Just to make the game more interesting — and give you an incentive to persevere — Electric has hidden details of a competition within the game. The closing date is set for Christmas and all you have to do is crack the adventure and notch up a high score.

According to Electric it's not easy and will take you a couple of months to solve, but the winner will be rewarded with a solid gold ingot!

Even if you don't enter the competition you'll be impressed by the graphics, with realistically scrolling corridors and fast moving hostile beasties.



10

CASS: £14.95

Yie Ar Kung Fu — by Konami

CART: £17.40

9



Chop Suey and his Triad gang have succeeded in throwing the entire Chinese kingdom into turmoil. Their ruthless terrorist tactics spell ruin for the country unless you can save the situation.

Clad only in a pair of blue pantaloons, you penetrate the Bamboo Shoot pagoda and surprise the evil gang. Against a backdrop of Chinese lanterns, you find yourself facing the first fiend — wicked Wang. He's a nasty looking character waving a quarterstaff.

Using all the fighting movements in your repertoire — straight punch, high kick, low kick, foot sweep, and most spectacular, a flying kick — you fight against this computer controlled opponent. As well as kicking you can duck, jump up vertically and even leap from one side of the opponent to the other.

Other opponents include, Terrible Tao the flame wielder, Chen the chainfighter, Lady Lan the Starflinger and Wily Wu who jumps through the air.

Points are awarded for various fighting tactics and defeating the opposition. Graphic effects are brilliant and the accompanying jolly Chinese tunes alternating with thuds as you hit each other are excellent.

This game is programming at its best. If you start playing it, you won't be able to leave it alone.

Anty — by Morwood Products

Morwood seems to have a knack for choosing some pretty bizarre-looking creatures and turning them into novel and entertaining games. And *Anty* is no exception.

As the title suggests, the game revolves around an ant with voracious eating habits. He consumes anything that is edible and within reach — and that includes fruit, leaves, branches and the odd cup and saucer.

The idea is to climb as many trees as possible, eat all that is available and avoid the park keepers who are out to get you with their anti-ant sprays.

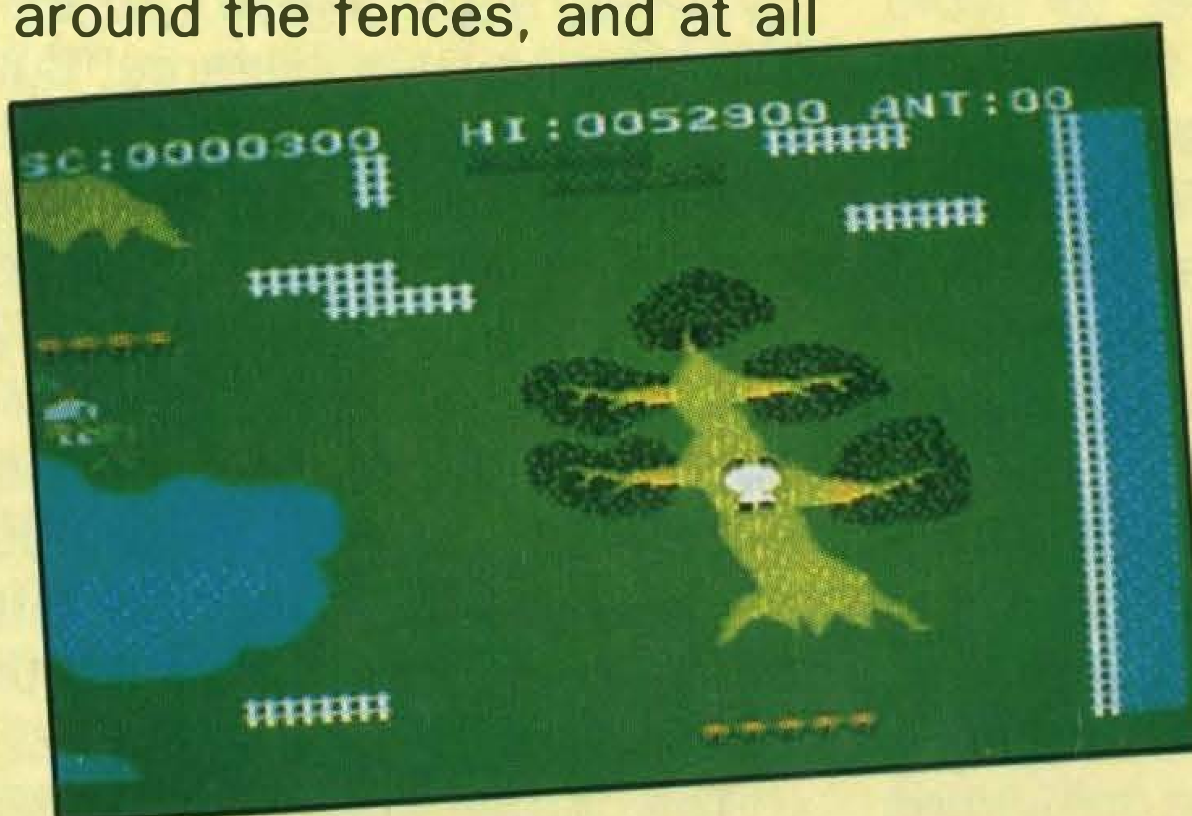
Anty can walk through any of the flower beds but he must go around the fences, and at all costs avoid falling into the pond — otherwise a life is lost. Six lives may sound generous but believe me you're going to need them all!

Although I enjoyed playing *Anty* there are a few niggles worth mentioning. Firstly, the instructions are too brief.

Secondly there are no indicators on the screen to show which level you're on.

I also found that it took quite a lot of practice before I could actually get Anty to chew, the secret being to hold the 'X' key and the CURSOR keys firmly down until you get a result.

Anty's graphics are OK, but for a price tag of £6.95, the sound could be improved.

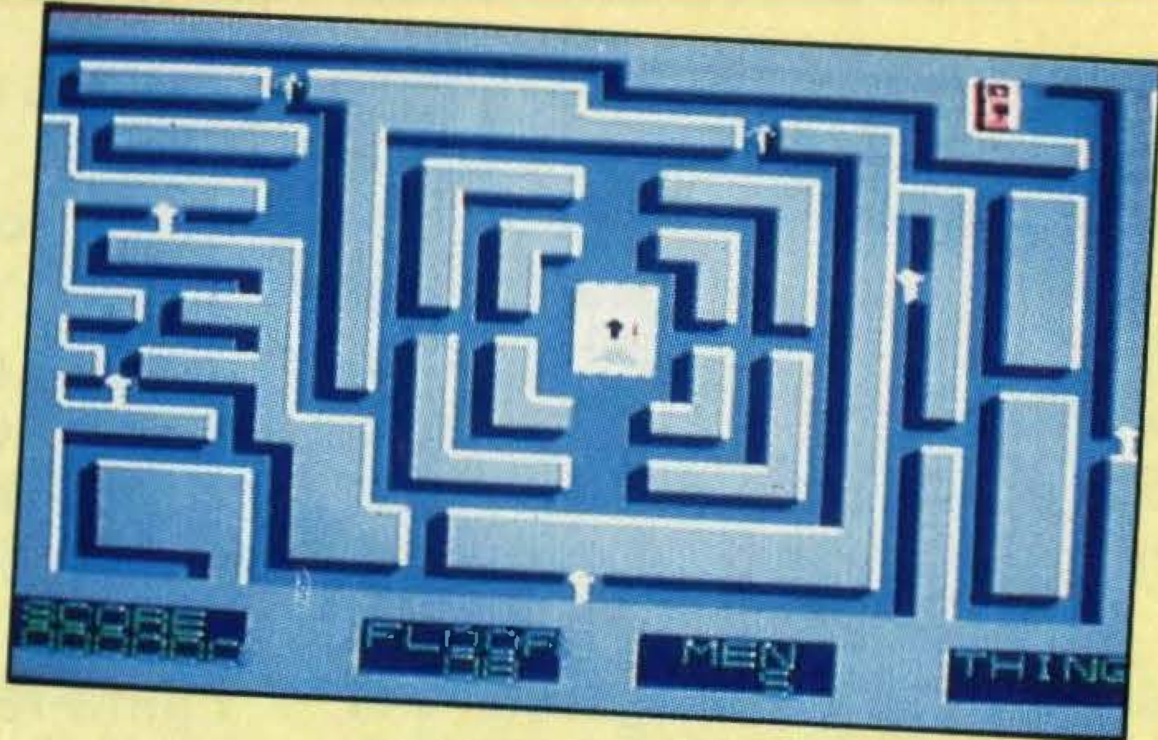


7

CASS: £6.95

Midnight Building — by Panasonic

CART: £18.80



7

Secret documents of great value are lying hidden on the first floor of a huge business complex, just waiting for an industrial spy like you.

As with the majority of secret assignments you set off at midnight, climbing through the building's roof to find yourself on the eighth floor. You have only a torch and a stun gun.

Each of the floors is pictured on screen as a blue maze and is guarded by three athletic security guards. Five white keys lie around the maze and the idea is to collect these, open a red safe which in turn unlocks the passage down to the next floor. The mazes get progressively more difficult.

But it's midnight and the floor is in total darkness except for a square patch of light emanating from your torch. When you first appear on the floor, it is bathed in light enabling you to memorise the key, safe and exit positions.

As soon as the darkness closes in, only a small patch of the maze is visible. If the guards wonder into this light they immediately head straight for you. If cornered you have only four stun bullets with which to protect yourself — so use them carefully.

Midnight Building is a maze game with a difference; it's exciting and addictive and to reach your goal, strategy, luck and a steady nerve are essential. At £18.80 it is a little over-priced for what it offers, but is still a jolly good game.

Minder — by DK'Tronics

Anyone familiar with *Minder* will love this computer game spin-off. Arthur and Terry, of course, are the two main characters in the game whose aim is to buy and sell goods.

Arthur starts out with £2,000 and a few rather suspect items such as bags of mushroom compost.

He starts the fortnight bright and early and has a choice of four locations: Terry's flat, the Lock Up, the Winchester and the Dealer Premises.

The Lock Up is the best place to store his goods. Occasionally Terry will be there so Arthur can give him instructions such as deliver, collect or dump stolen goods. If Arthur fears rough treatment, Terry will mind him — for a price.

The whole game is based on money — what Arthur can buy or sell at the best price for himself. Some of the conversations between Arthur and the dealers in the Winchester are fairly amusing.

Many of the regular dealers become familiar after a while as mugshots are displayed on screen. Bundles of adult mags, rabbit hutches and garden gnomes are all saleable merchandise, but Arthur has to be careful when Sgt. Chisholm appears on the scene.

It takes getting used to, but *Minder* is a challenging game and is certainly worth spending a few hours with.



8

CASS: £9.95

Chiller — by Mastertronic

CASS: £1.99



6

Some dastardly person has stolen the hero's girlfriend and locked her up in some ghastly haunted house. Her boyfriend is understandably a little distressed by this and sets out to get her back.

Making life difficult are giant spiders, webs and blue mushrooms. If any of these are touched by the boy, his energy quotient is reduced. It's important to keep an eye on the energy meter as once that runs out he's had it. Fortunately energy can be replenished by eating purple mushrooms.

Once all the crosses have been gathered, the boy has to make his way through a cinema, avoiding falling snowflakes and old women. If he manages to collect the crosses he moves into the ghetto.

The ghetto graphics are messy, making it hard to distinguish the various ghouls, bats and zombies from the crosses. Once the ghetto has been safely negotiated and all crosses collected he passes into the graveyard, literally crawling with horrible creatures. Finally he gets to the haunted house.

She appears at the door, but as soon as happiness seems to be theirs, their troubles start all over again — they have to go back the way he came.

Chiller's sound effects are fairly good, but co-ordination between the controls and the boy's actions on screen could be improved.

Still, for £1.99, it is certainly worth the money.

Zakil Wood — by Mr Micro

One fine day an evil crook called Grod crept into a village at the edge of Zakil Wood and stole the priceless village ruby.

Someone has to undertake the dangerous and physically demanding voyage into the woods, and there are no prizes for guessing who!

To help you with your quest, Mr Micro has obviously gone to a lot of trouble to illustrate each location with bright colourful graphics. Not only do they enhance the game, but they also appear very quickly.

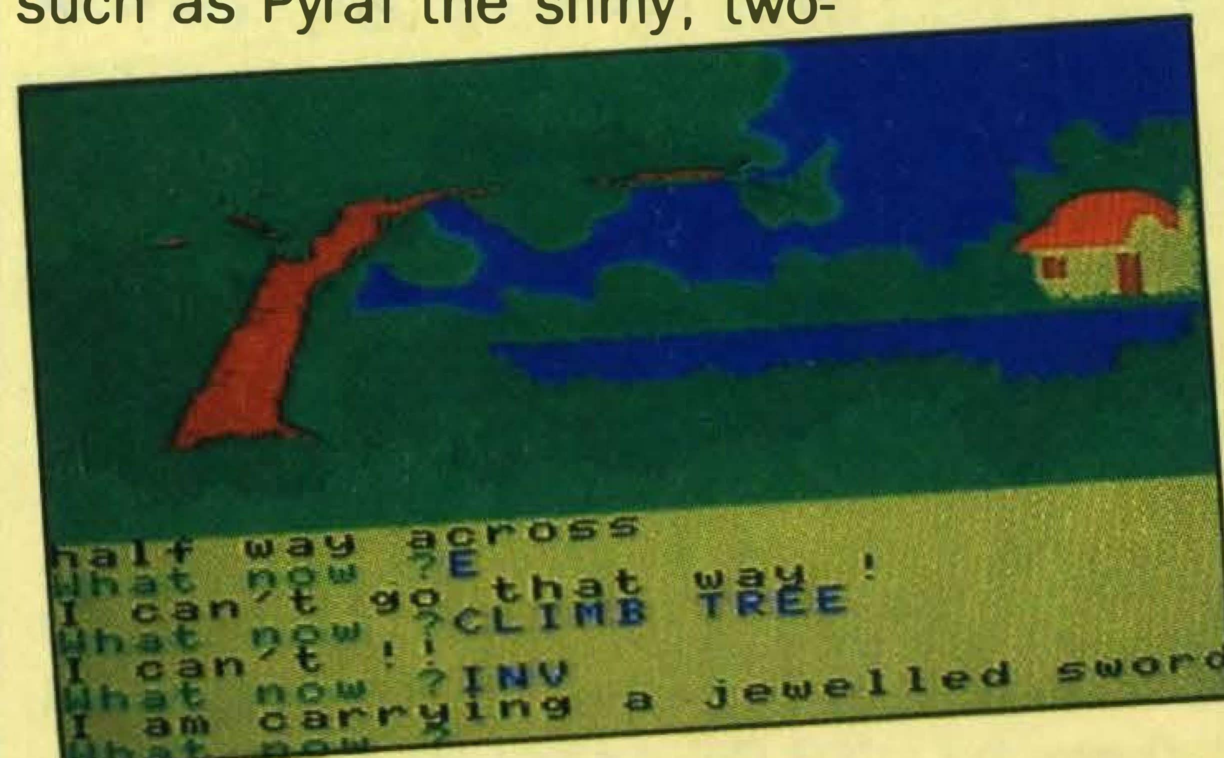
In so many graphic adventures, the would-be adventurer has to wait ages for the pictures to appear.

Imaginative and humorous characters and descriptions such as Pyral the slimy, two-headed monster, or the recipe for two bat's eyes, one Warlock hair and four angel tears, give the game its whimsical charm.

Zakil Wood is an excellent game for both novice and seasoned adventurers because it will captivate an inexperienced person long enough to solve the clues while presenting a real challenge.

There is no SAVE facility, mainly because the game can be solved in 130 moves. Every time you die, your percentage score and the number of moves made is given.

At £7.95, *Zakil Wood* will provide a lot more entertainment than some similarly priced arcade games and is great value.

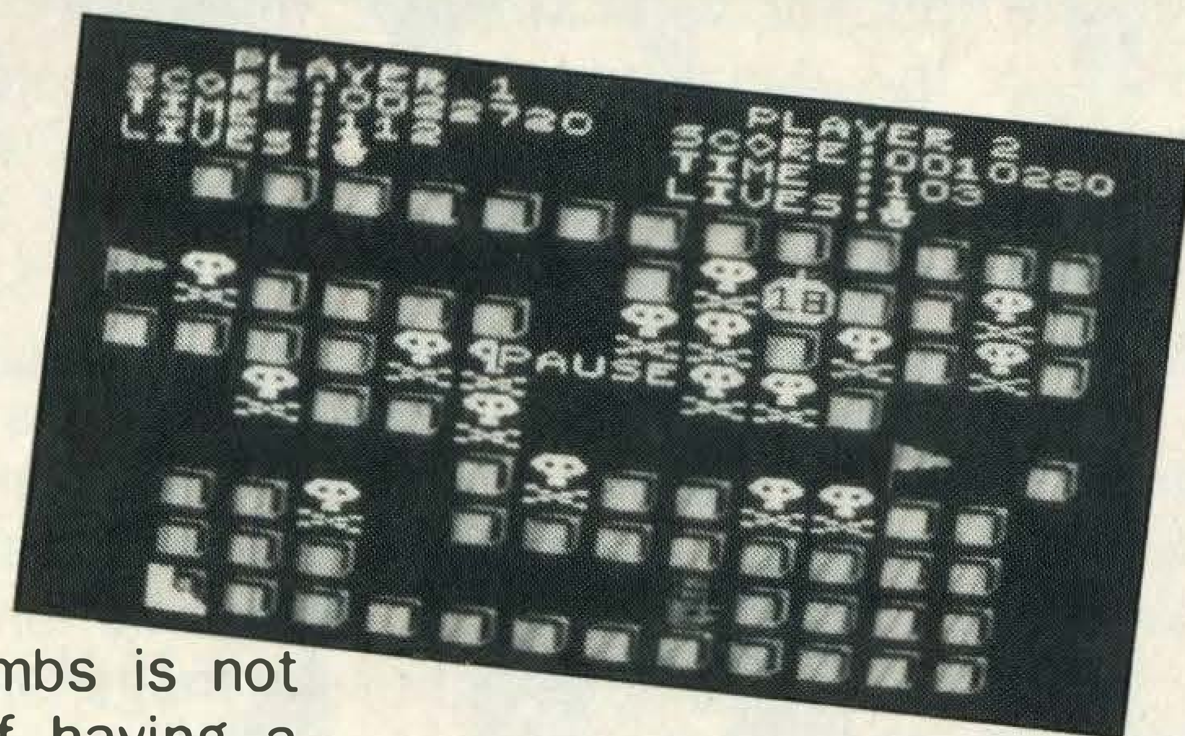


8

CASS: £7.95

Gridtrap — by Livewire Software

CASS: £1.99



5

Defusing time bombs is not everyone's idea of having a good time, but Livewires' *Gridtrap* is all about this rather morbid subject.

On screen, you are presented with a grid made up of square blue blocks. Studded all over these blocks are skulls and crossbones, red flags and purple time bombs.

You are controlling a green top-hatted head and have the dubious task of walking round the grid defusing five of these time bombs in order to pass onto the next level. The bombs don't all appear at the same time and when they do appear their location is completely random.

The strategic aspect of the game is provided by the fact that blocks disappear as soon as you've passed over them. As you can't move over empty space, you have to be careful not to walk yourself into a corner.

Danger is created by wandering yellow boots and the skulls. If you bump into either of these, one of your three lives is instantly lost.

One or two players can participate and a high score table promotes a sense of competition. The graphics are not especially good and the controls unresponsive.

Gridtrap is an innocuous sort of game — it's not an exciting, fun packed game, but it's playable, needs some strategic thought and probably worth the £1.99.

Illegus — by Panasonic

Al-Mazar, a mysterious, inhospitable planet, is covered by a vast network of mazes. You have drawn the short straw and find yourself in the first maze, with no food, water or light. Somehow you have to escape from not one but 10 mazes.

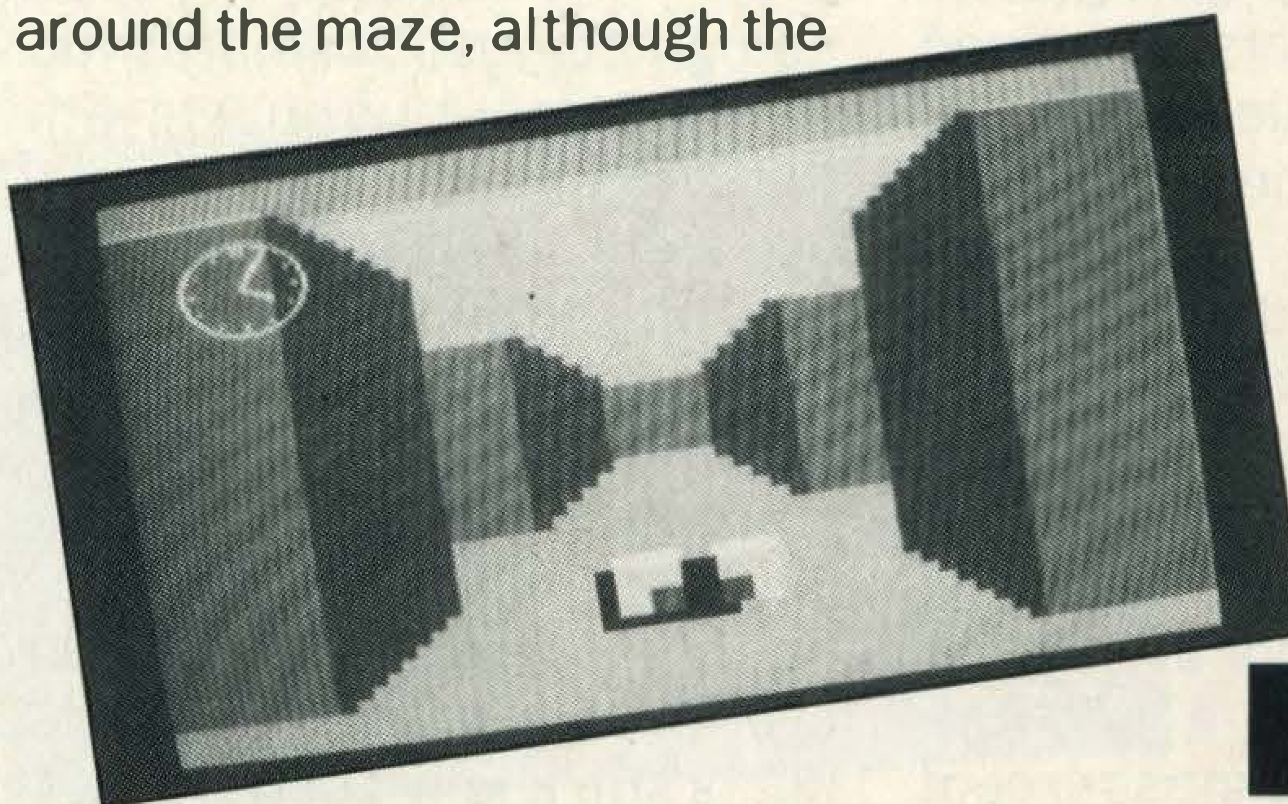
In full daylight the labyrinths are all coloured green and yellow. Your path through the maze is brilliantly portrayed on screen as if you were actually standing inside one of the labyrinth corridors, the maze walls looming up on either side. Various shades of green help to give each labyrinth a three-dimensional look.

Various objects, both dangerous and useful, lie around the maze, although the graphics are so indistinct it is hard to distinguish what is what. Food and water will increase your energy.

Maze guardians or robots annihilate you on sight unless you get them with a laser gun first. Falling into dark pits also results in instant death.

Infra-red viewer spectacles are essential for night time viewing as when the red sun sets, the maze turns dark blue and black making it virtually impossible to see.

Heading for the sun, symbolised by a red cross, is the best plan. Mapping out the labyrinths on paper is quite difficult, so you need a good sense of space and direction.

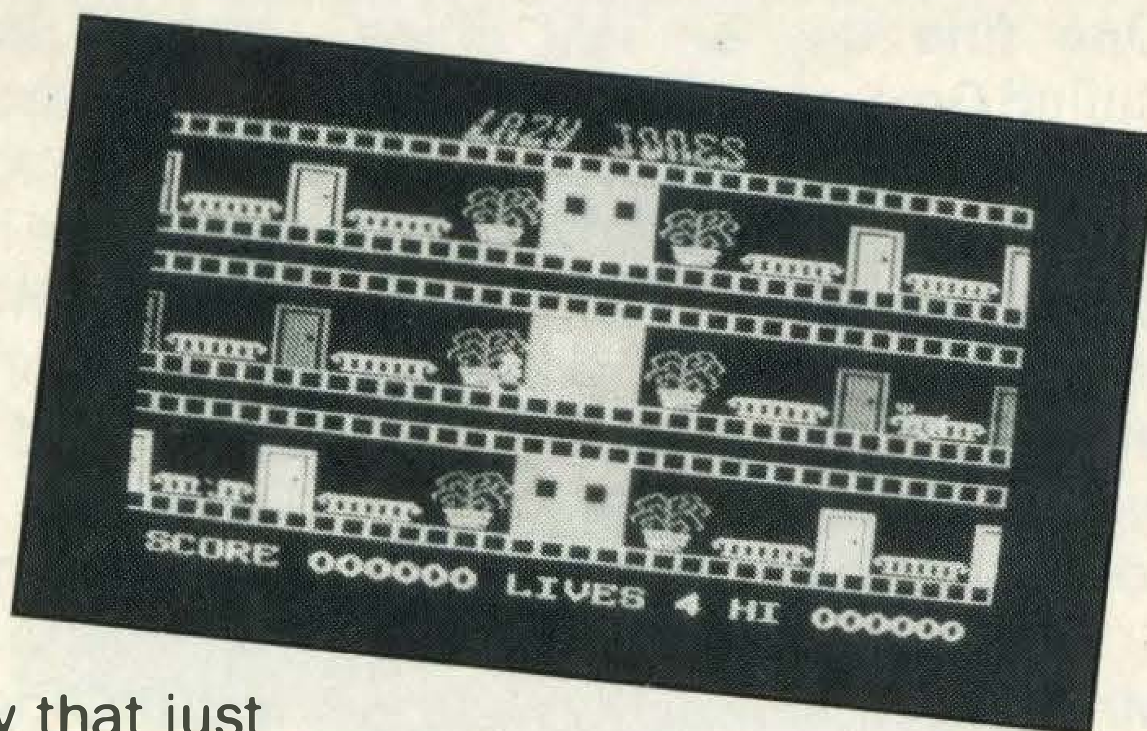


7

CART: £18

Lazy Jones — by Terminal Software

CASS: £8.95



8

Lazy Jones is so lazy that just thinking about work gives him a heart attack. But, like everyone else, he has to earn a living and so gets a hotel cleaning job.

The hotel is one with a difference because although it appears quite normal — three floors, 16 rooms, a lift between floors and potted plants in the corridor, not all of the rooms are *bona fide* bedrooms.

In fact most of the rooms contain some sort of computer game. Helping Lazy Jones to play every one of these and to win lots of points is the purpose of the program.

As he wanders along the corridors, his arch enemies, the hotel manager, his ghost and the dreaded cleaning trolley appear. If Jones fails to jump over or avoid them by diving into a room, he loses one of his nine lives.

Once in a room, Jones is either faced with one of the many different types of arcade game or something more mundane, such as a toilet or broom cupboard.

In Turk, one of the games, he has to shoot forks at a turkey laden conveyor belt while avoiding flying telephones at the same time. In Res Q, he has to fly around a jungle rescuing mad gorillas and in Outland he must annihilate revolving space craft as they try to land.

Once all the games have been played, Jones moves onto a second, faster level. Both the graphics and sound are of excellent quality and at £8.95, *Lazy Jones* is a must.

First Steps — by Mirrorsoft

Roger Hargreaves' *Mr Men* books and TV programmes have been a tremendous success with children all over the world and their inclusion in Mirrorsoft's educational series seems to be the logical choice.

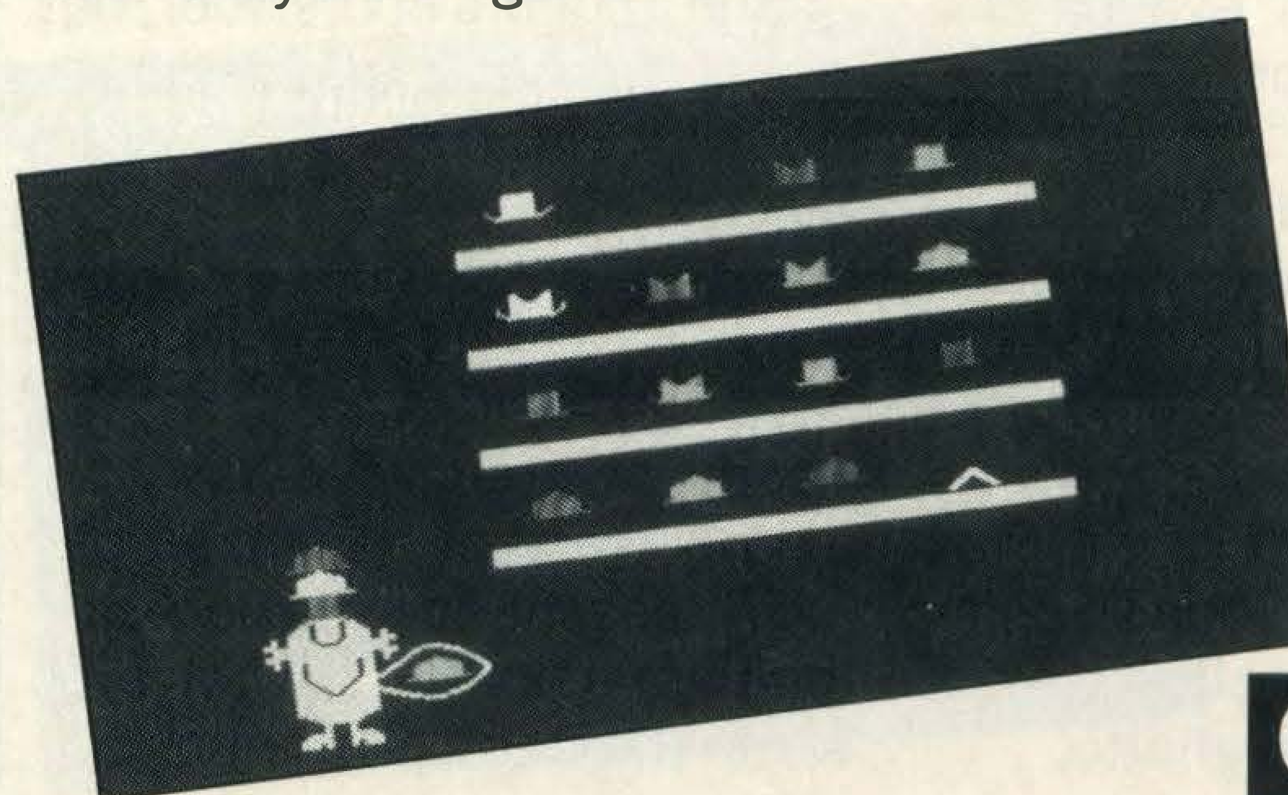
A book full of bright colourful pictures accompanies each of the stories and is written in the familiar Hargreaves style.

Mr Greedy, the star of the first game, is as usual starving. He wanders into a huge room which is empty except for a huge ice cream cone sitting in a corner. All the child has to do is direct Mr Greedy, a funny little creature with floppy arms and a waddling gait, to the ice cream.

Mr Silly's hat game is the next story. Four shelves contain 16 hats, each shaped and coloured differently. The one he wants to try on appears in a 'think bubble.' By moving the cursor to the relevent hat and pressing RETURN it reappears on top of his head.

The last two games both feature Mr Forgetful and 12 wardrobes. In one game six pairs of footwear are distributed so that one of each pair is inside a wardrobe. Mr Forgetful has to open each door and match up the six pairs. Letters replace the footwear in the last game.

As educational programs go, this is quite good and kids will love it.



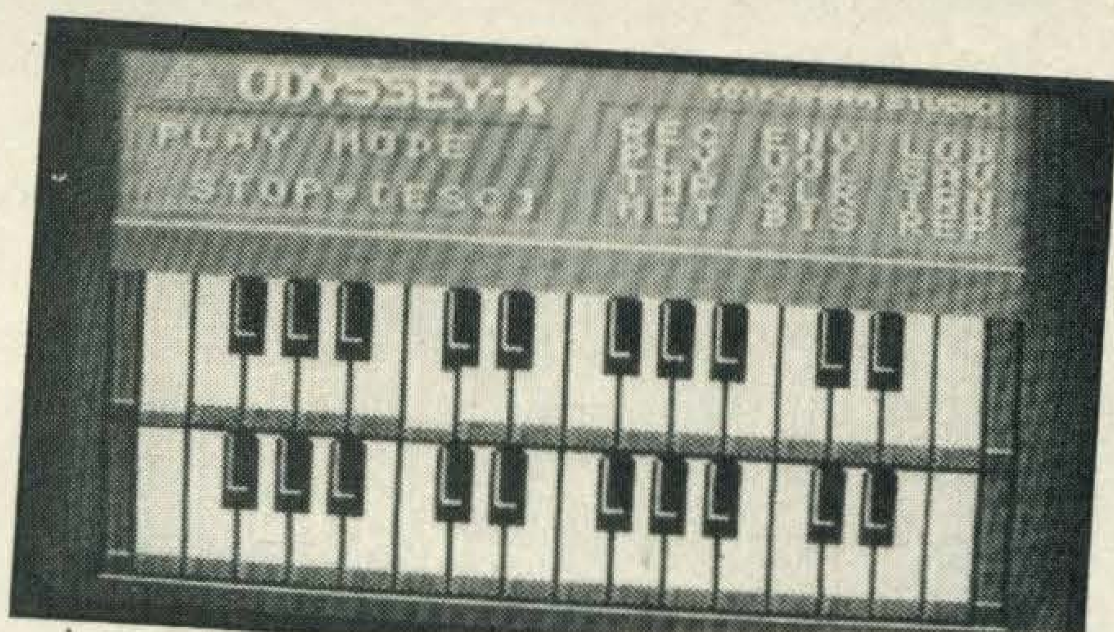
8

CASS: £8.95

Odyssey-K by Rittor Music

CAS: £11.95

9



As yet there haven't been many music programs available for MSX, but the situation is changing and the latest addition is Rittor's *Odyssey-K*.

To whet the appetite the program starts off with a rendition of Scott Joplin's *The Entertainer*, also known as the theme tune to *The Sting*.

Once the novelty has worn off you are left with a menu offering 12 different functions. At this stage we should point out that musical knowledge is a must.

By choosing the appropriate function you can compose a masterpiece, alter the tempo or, if you don't like it, completely change it.

Odyssey-K's great versatility allows you to alter the three recording channels and produce some pretty unusual sounds, alter sections, overdub and check each channel individually to see if the melody is quite as you expect.

The main disadvantage with the program is that it doesn't allow you to play two or more notes simultaneously. Also, it can only play in 'real' time so you have to make sure that what you're inputting is correct; in other words the notes are recorded exactly as you play them. If you're a lousy musician it will reflect your mistakes.

For £11.95 you can hardly expect the quality of a modern synthesizer, so it's a good place to start if you are seriously interested in composing music but can't afford to go for the real thing.

Trigonometry by Morwood

Trigonometry is the sort of subject you can either do or you can't. If you can, read no further; if you can't, this set of three cassettes may be the answer to your trig troubles.

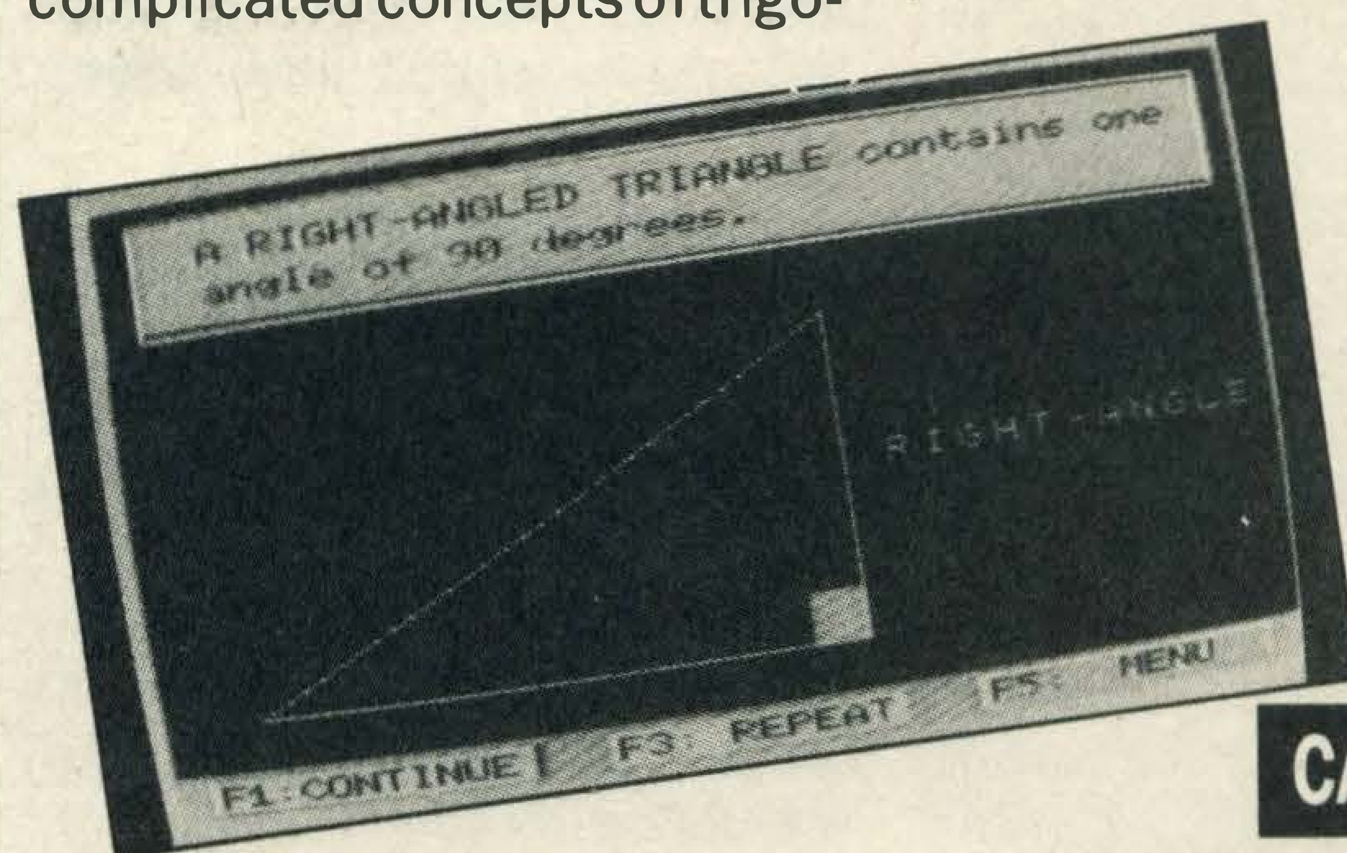
Aimed at 11 to 14 year olds, the program sets out to define all the important equations and definitions involved in trigonometry dealing with the relation of the sides and angles of a triangle.

Although it doesn't go into the subject in extensive detail it will help anyone having difficulty trying to understand the difference between a cosine and a tangent.

Before leaping into the more complicated concepts of trigonometry, a right angled triangle is first defined; both in words and with a diagram containing a pink square in the 90 degree angle. All formulae and definitions are similarly illustrated.

Everything is made to sound very simple and just to make sure you've got the gist, five simple problems are posed, for instance 'What is the length of the Hypotenuse?' These are probably too simple as in a classroom situation a similar question might be posed in a more cryptic style.

Although most 11 to 14 year olds need a lot more information than is provided, the program is worth £7.95.



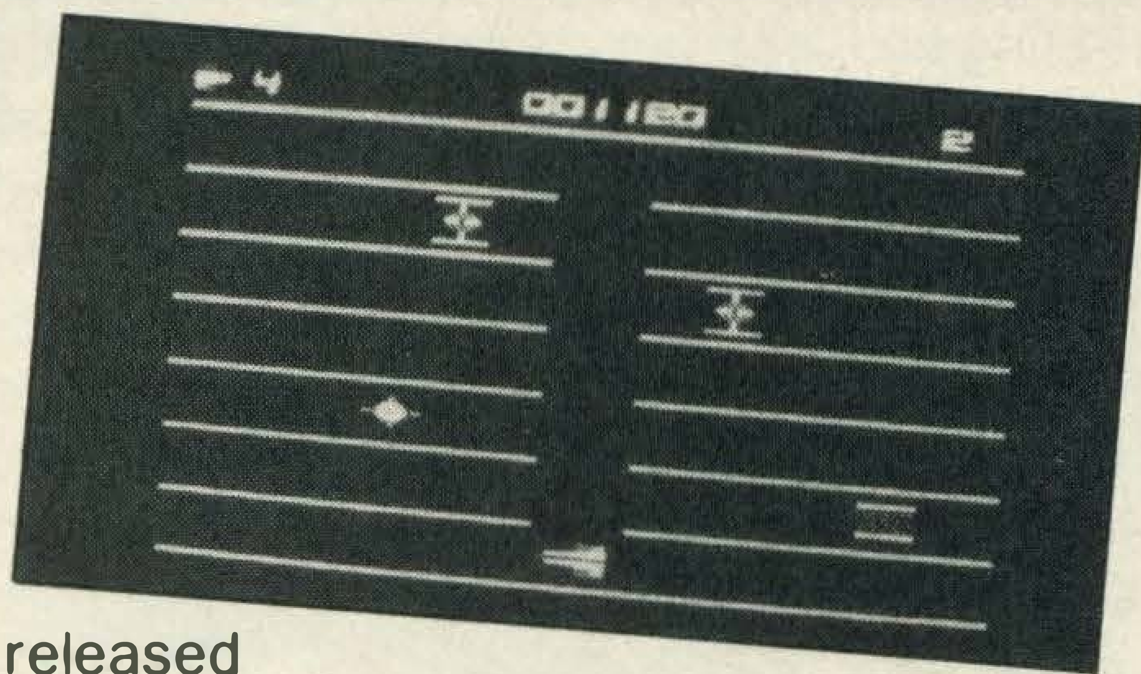
6

CASS: £7.95

Turmoil by Panasonic

CART: £18.80

4



Panasonic hasn't released many titles (which are under copyright from Japan) for the UK market and after playing *Turmoil* we can see why!

The story goes as follows; your starship has entered an area of space where you are restricted to vertical and horizontal movements.

While battling against the enemy you must also collect alien eggs which, if left, will hatch and come after you.

There are nine levels of play, level one being the easiest and nine the most difficult. But you don't have to work through all the levels. Pressing the SELECT key allows you to choose which level to play.

If you get bored with *Turmoil* the game can be temporarily suspended by pressing the ESCAPE key.

The blurb on the cartridge box makes the game sound exciting and action-packed. It's certainly the latter and there are a good many games players who enjoy whiling away the time clocking up high scores and blasting every object in sight.

But we prefer games with a little more meat and screens that aren't carbon copies of the first one.

Turmoil has limited appeal and the novelty will probably wear off after a couple of hours. It's a pity because some of Panasonic's other titles offer excellent value. Unfortunately it's picked the wrong game to show off Japanese programming. We can think of much better titles that warrant an £18.80 price tag.

Icicle Works by State Soft

Boulderdash, one of the games mentioned in our top 20 games round-up, was a great success when it first came out in America on the Atari games system. Since then the idea has often been borrowed.

Icicle Works is very similar to *Boulderdash* in theme, but has enough distinguishing features of its own.

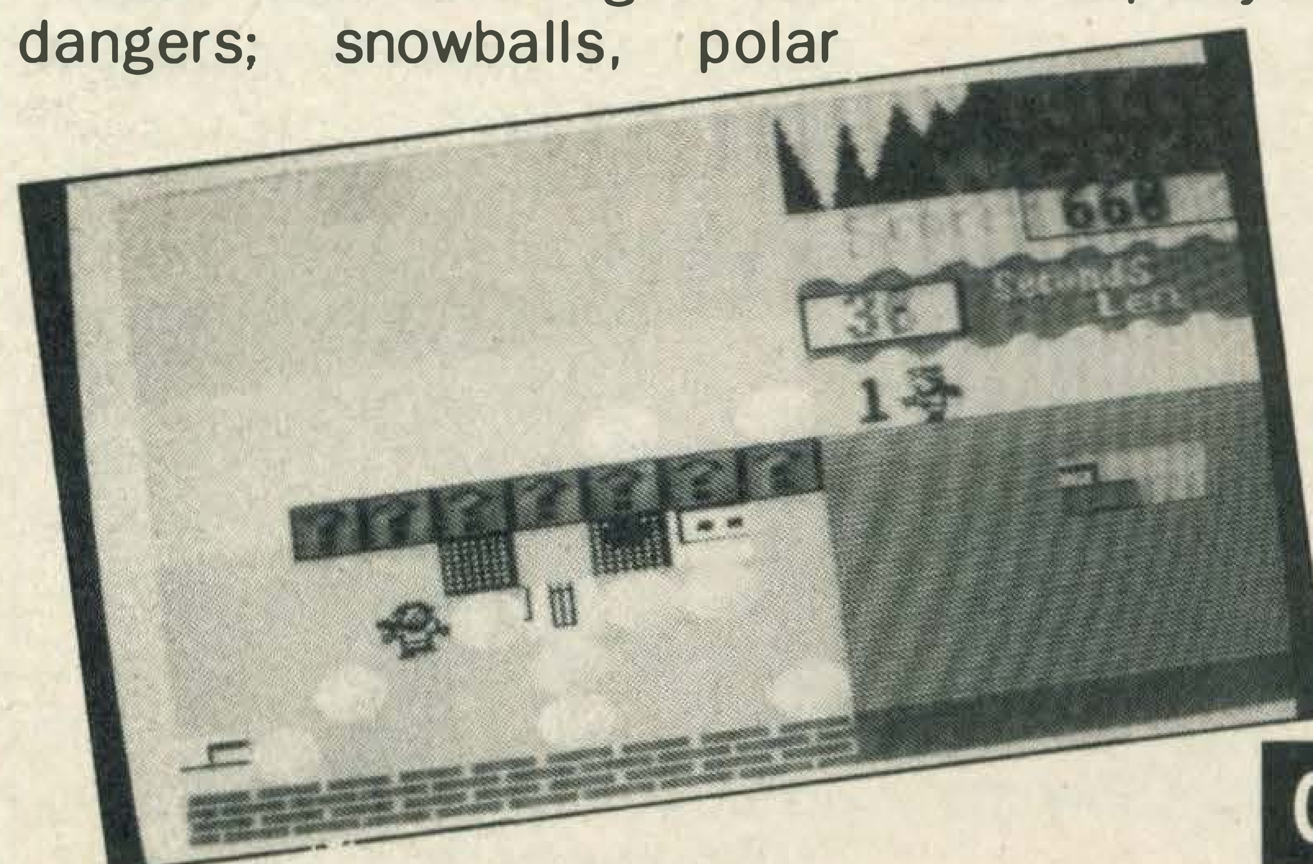
The player controls a little man and before he can enter any of the 13 different screens, a giant key has to be picked up.

It is important to choose a good route through the levels because very strict time limits are imposed if you go along the wrong route.

Each level is fraught with dangers; snowballs, polar bears, penguins and iced water. In most levels the idea is to dig out various combinations of snowballs, avoiding being crushed as they topple.

By dropping snowballs onto grids, penguins or polar bears, parts of a toy such as a boat or a radio are revealed. As these are collected they appear on screen and once the toy is complete, the man can move onto the next level. You need superb timing.

Icicle Works is extremely addictive and once you've got over the initial disappointment of the man's slow movements and the jerky and inefficient screen scrolling, you won't be able to pull yourself away.

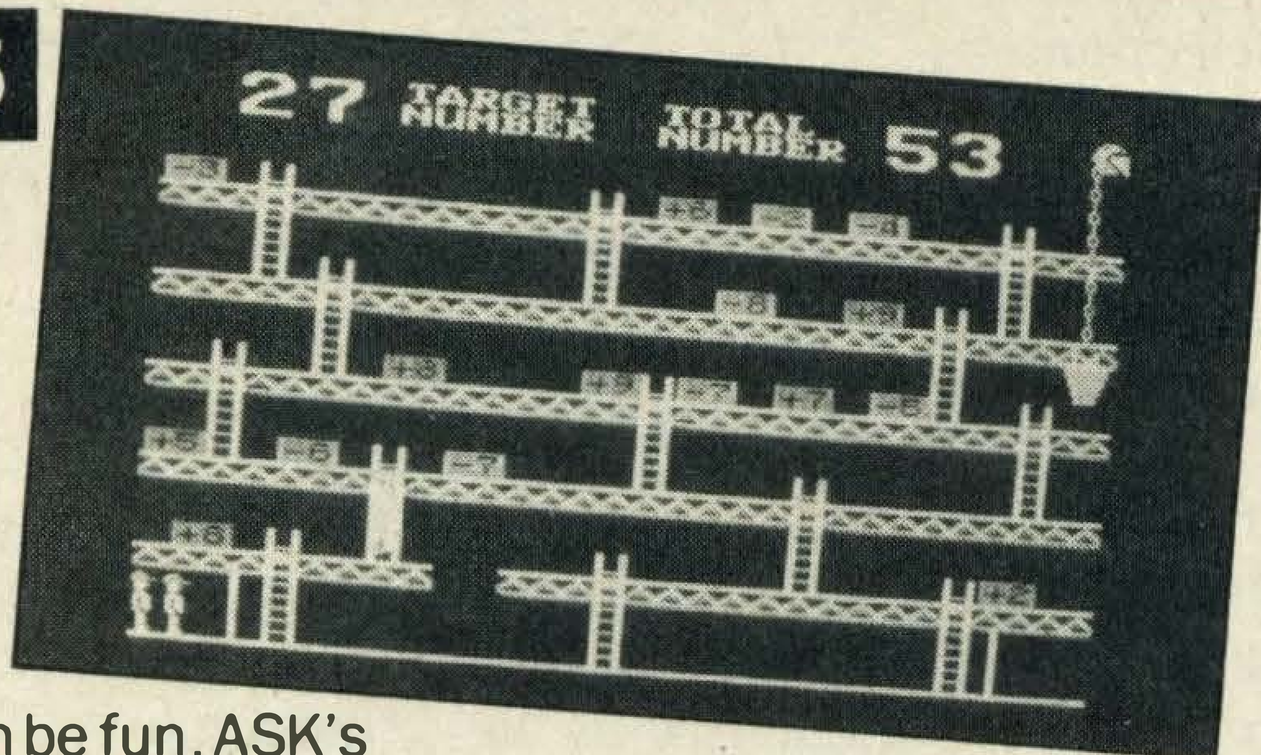


7

CASS: £7.95

Number Painter — by ASK

CASS: £8.95



7

Mathematics can be fun. ASK's educational program, *Number Painter*, demonstrates this well by incorporating quite complex sums utilising addition, subtraction, multiplication and division into a platform game.

All action takes place on a building site featuring iron girders, buckets of paint, ladders and three painters. Before starting the game, the player has to choose a difficulty level from a range of 12 as well as the type of painter from a choice of four.

Along the top of the construction site scenario are two numbers; the TOTAL and the TARGET. Lying around the girders are various numbers with minus, plus, division and multiplication signs in front of them. By painting some of these numbers with his paintbrush, the painter should be able to manipulate the TOTAL number so that it is exactly the same as the TARGET number.

Level one is fairly simple, but in level 12 the numbers go up to 1000 — we found some of the mathematics here pretty difficult!

As the painter paints each number, a bucket rises a little bit, and if he takes too long getting to the right answer the bucket tips over and covers the screen in green paint.

Some of the levels are difficult, but they are real sums and all youngsters from five to 14 should benefit.

Gang Man — by Hudson Soft

In the world of gangsters, displeasing an enemy gang inevitably means that you can kiss this world goodbye.

This is precisely the rather unhealthy situation in which you find yourself in this game. You're making a get-away in a red sedan, but the hoods, clad in disgusting purple jumpers which clash glaringly with their carrot-coloured hair, are after you and they're not armed with water pistols either.

On screen, you are given a bird's eye view of the road where all the action takes place. Your man, dressed up in a green sweater and lemon yellow Homburg — no taste these gangsters — is also armed with a gun and loads of ammunition.

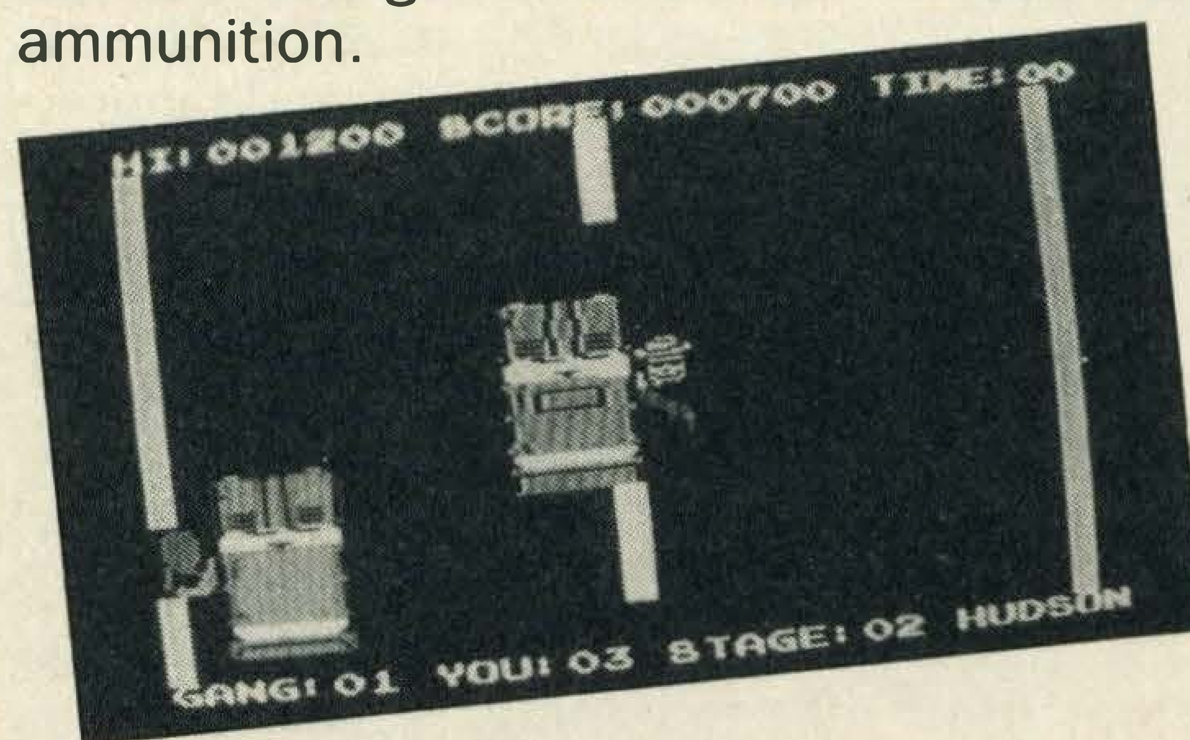
In the first level, he only has one gangster to contend with. If he can kill him within the 10 second time limit he gets a bonus score.

Running over bags of gold and diamonds lying in the road also fetches bonus points.

Controlling your gun takes a little getting used to because the gun fires in the opposite direction to the one in which you're moving.

Sound effects are excellent; sounds of cars purring along the road are interspersed with realistic gun shot noises. Graphics are typically colourful and realistic.

Gang Man is fairly addictive and will entertain those of you with a violent bent for hours.

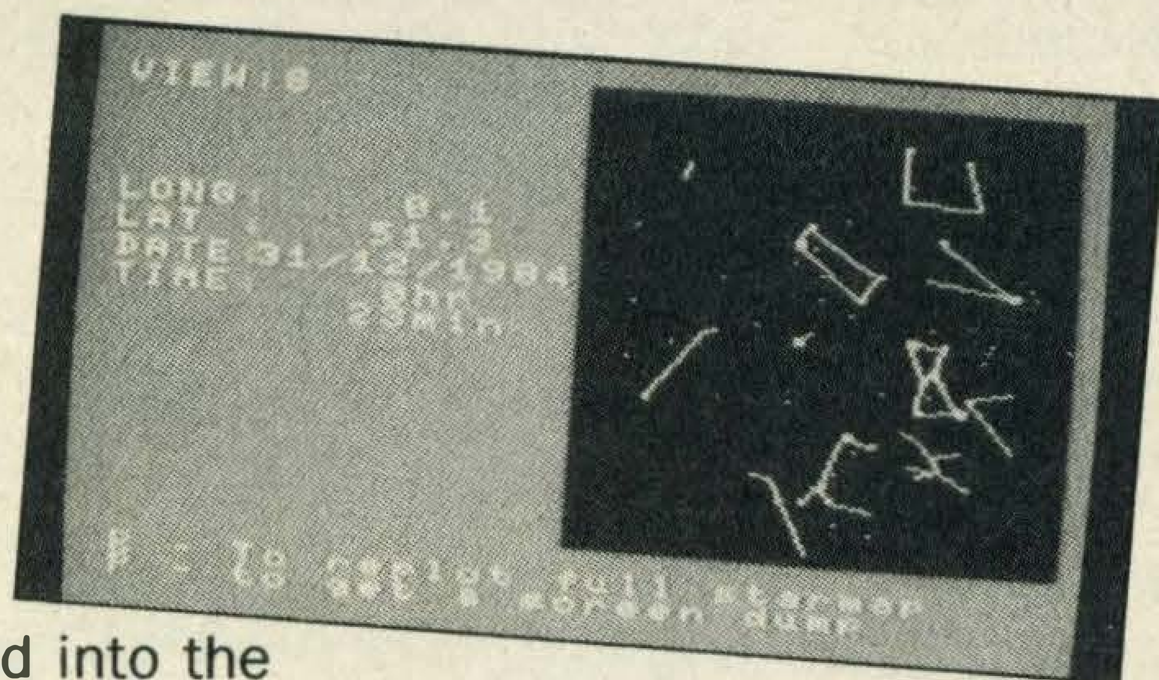


5

CASS: £7.95

Star Seeker — by Mirrorsoft

CASS: £9.95



7

Have you ever gazed into the night sky, and wondered about the origins of the universe or whether there's life on Mars? This program won't answer those questions, but it will tell you what you're gazing at.

If you are interested in astronomy, or even have passing interest, you may find this package interesting.

On the first side, *Star Seeker* allows you to set your location on Earth and then look at any portion of the sky.

A star map is drawn, using crude graphics. You can then obtain a print-out of the screen or ask the computer for information on any of the stars shown.

If you're interested in constellations the program will 'join up the dots' to show the various groupings.

The second program is *Solar System*. This gives you planet positions as well as details about things like their brightness.

Perhaps the best part of this program is the moon information. For any date and time you're given the position of the moon and its phase — the latter being backed up by a simple diagram.

Other facilities include sunset and sunrise times and the facility to trace the orbits of the planets, although the plotting is horribly slow.

The graphics are primitive and the overall screen presentation merely adequate. But the program could be invaluable to those who take an interest in the stars.

Shnax — by Kuma

Rolling two arcade games into one should combine the thrills and spills of each one to produce an exciting addictive megagame. Unfortunately *Shnax*, although a mixture of two popular games, *Pacman* and *Pinball*, is both frustrating and irritating.

This is a shame as it does have some attractive features. The first screen to appear is a vividly coloured angular maze filled with white dots.

The aim of the game is to guide a bright blue munching creature round the maze gobbling these dots up. Life is complicated by several spider-like creatures which appear out of nowhere and chase you around.

Control of the creature is difficult — we tried several joysticks, but found the controls jerky and slow, and moving round corners was an action strenuous enough to bring sweat to one's brow.

Bonus points can be gained by passing over shields, pogo sticks, mirrors and homes. Passing over a home square enables you to return to the starting position at the press of a fire button, but the effect doesn't last long. Moving over the mirror can move you to the opposite side of the maze.

Altogether there are ten different levels, each one getting a bit faster, but as the joystick controls are so bad, it is doubtful that anyone will ever reach the top.



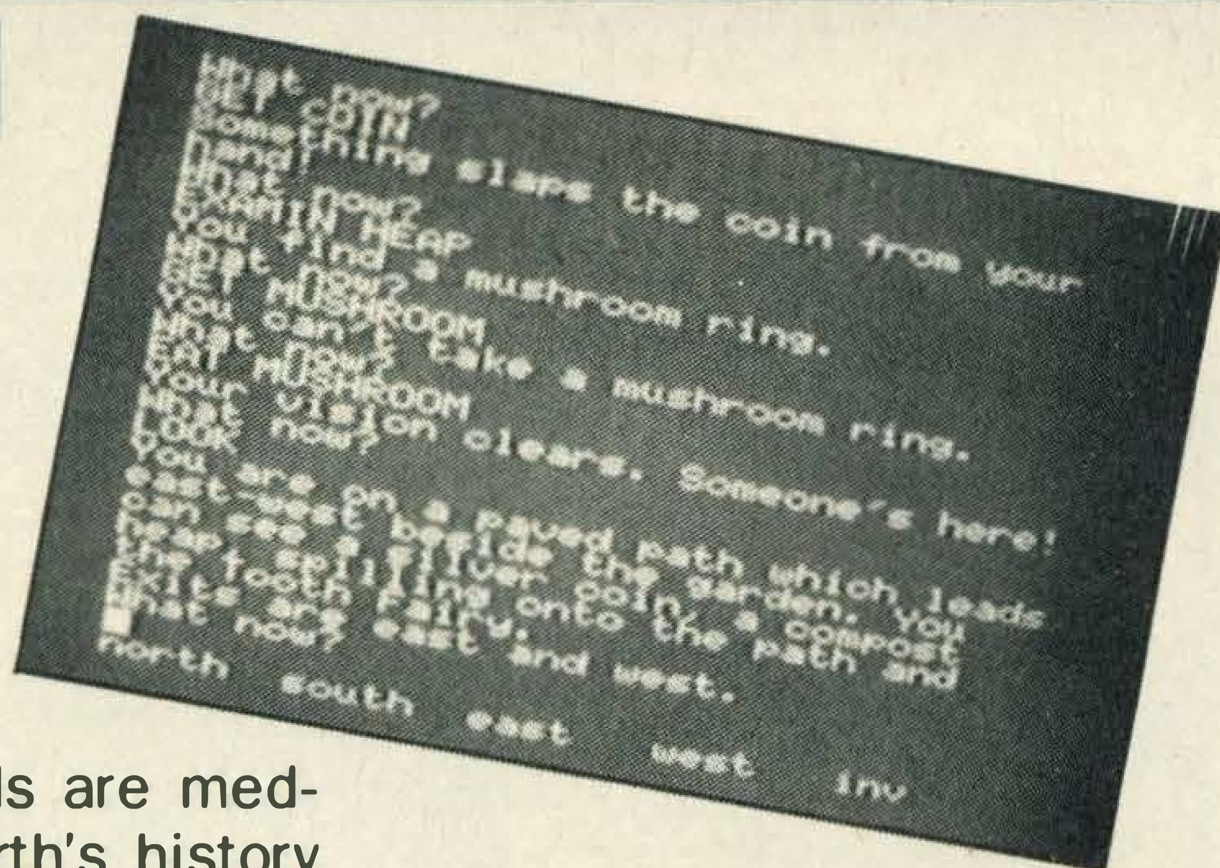
4

CASS: £6.95

LORDS OF TIME — by Level 9

CASS: £9.95

10



Nine evil timelords are meddling with the earth's history and Father Time has decided you are the only person brave enough to save the world.

Of course, defending history is no easy task. Somehow, you have to travel backwards and forwards in time collecting nine unusual items. When amassed these have to be presented to the nine nasty lords.

Lords of Time is a brilliant text adventure and surpasses Level 9's consistently high standards. It is text only, but the descriptions of characters, places and objects are so ingenious that graphics would be superfluous.

Imaginations can run riot in this game and as you wander round the various time scenarios you meet Roman guards, fire breathing dragons and splendid androids.

Objects such as minstrel lutes, casks of ale and galactic groats lie around waiting for you to steal. However some of them can get pretty unpleasant if picked up without permission — but we won't spoil the fun by telling you which ones!

Puzzles and cryptic clues abound and all you have to do is move around with your eyes wide open examining everything and anything for clues.

All Level 9 adventures are good, but for £9·95 you'd be hard put to find a computer game of better value.

Aackotext — by Silversoft

If a computer system is serious about trying to sell to the business market, it needs decent business-like software like Aackosoft's word processing program.

The first thing you notice is the superbly packaged, ring-bound manual. The software is slipped into pockets and is supplied on both tape and 3.5inch disk.

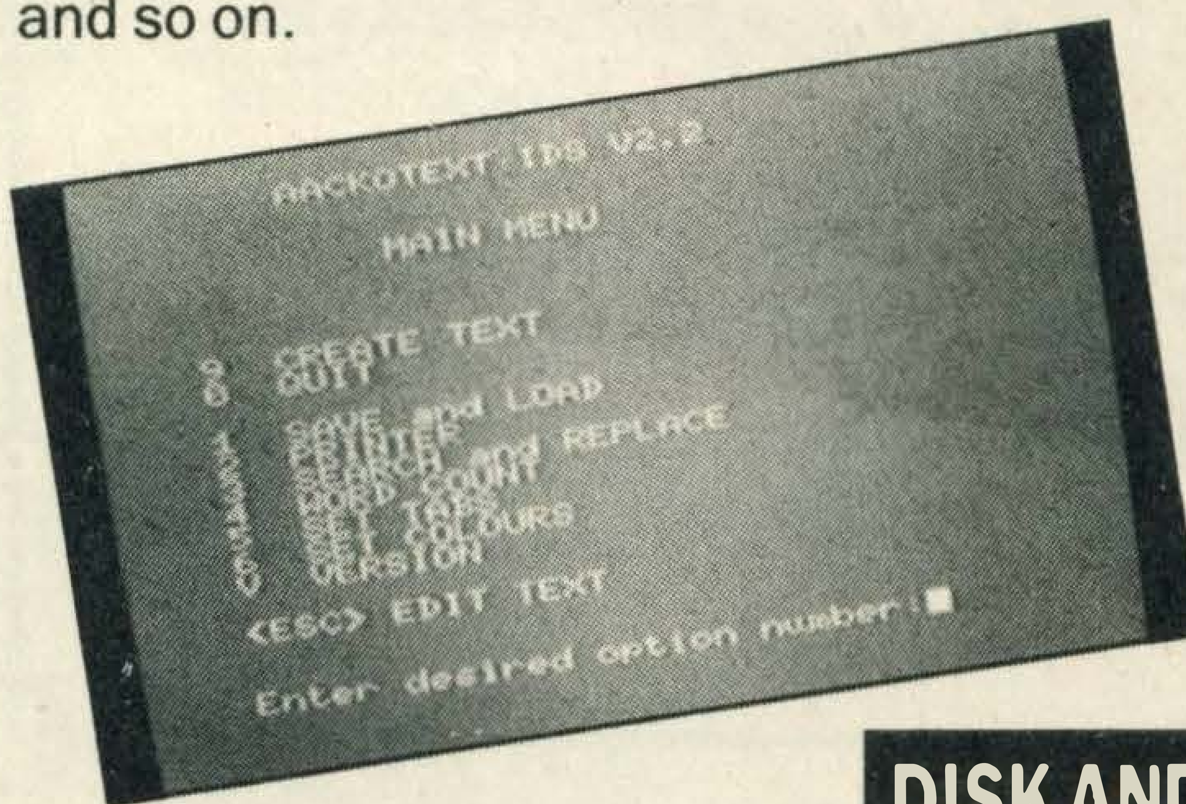
Using the word processor couldn't be easier. The ESCape key toggles the program between the editing mode and the main menu.

From this menu you can access features such as printer formatting, saving to and loading from disk and tape, and so on.

The program has many features — search and replace, multiple copies (when printing) and block move, where you can shunt around large amounts of text.

Aackotext is not as versatile as fully professional word processors. Nor does it have the same range of features as Kuma's *WDPRO*. But it is adequate for writing letters and average length articles.

Text is restricted to 40 columns in edit mode, but Aackosoft has devised a cunning graphic method of showing the text in its formatted form. All in all, it's a worthwhile investment.



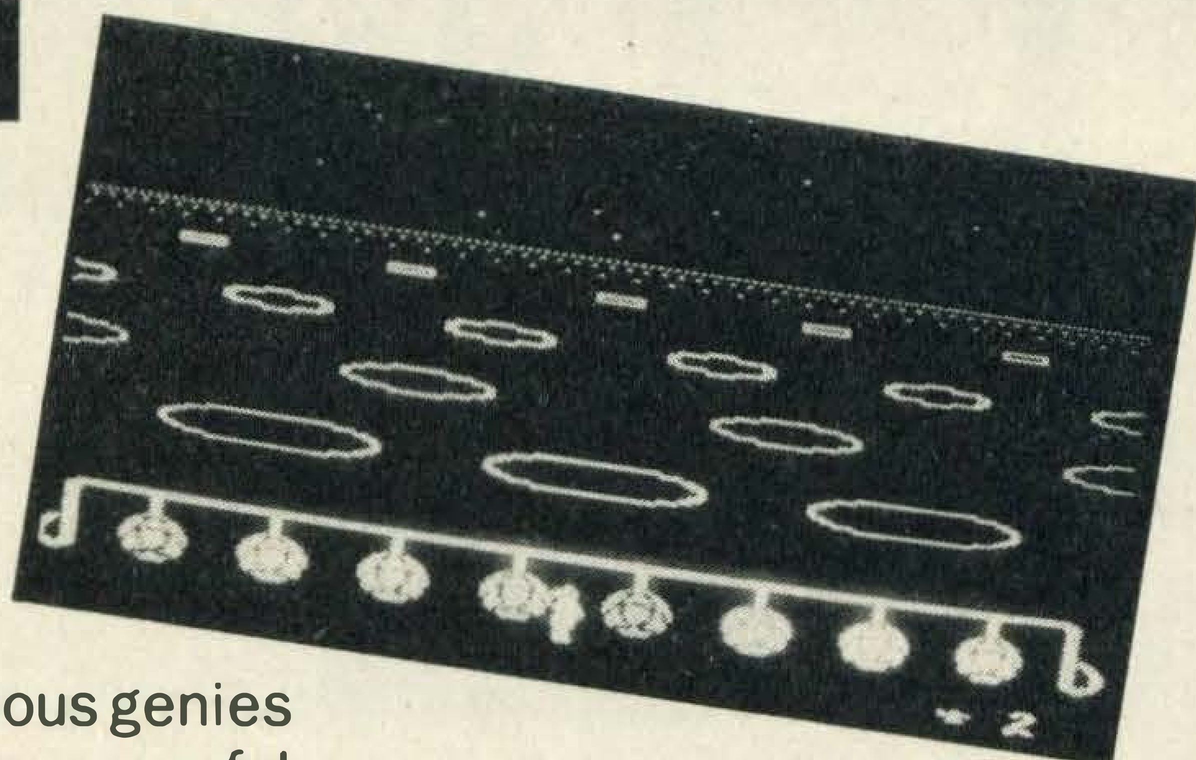
8

DISK AND CASS: £39.10

Master of the Lamps — by Activision

CASS: £11.99

7



A bunch of mischievous genies have turned a once peaceful land into a lawless chaotic hell. One day, a happy young prince, anxious to prove his worth, decides to rid the country of these magical pests.

There are three sections to the game. Starting with *Seven Trials* is the best plan because the tunnels are easier to navigate. The prince, riding a magic carpet, has to pass through a tunnel of colourful diamond shapes.

Guiding him through is no mean feat as the tunnel dips up and down and sways from side to side. Hitting the side causes the prince to restart the level.

Once through, he has to hit one of a row of eight colourful gongs three times. A turbanned genie appears, blows his hookah and produces smoke balls (two puffs on level two, three puffs on level three and so on). These turn into coloured notes.

If the prince can hit the gong of the same colour before the notes hit the ground, he goes onto the next level and part of a lamp appears. If seven levels are finished, the lamp is completed.

Throne Quest is the real test. Not only do three seven-piece lamps have to be completed, but the scenarios get more complicated.

Sound and graphic effects in *Master of the Lamps* are superb. To sum up, it's a challenge and deserves to be played.

Cards — by Computermates

We're always being told that a home computer can be used as an address book or filing system. But usually the software isn't up to it, and most people find themselves going back to pen and paper.

Cards could change that. As the name suggests, the program is based on an index card type of system.

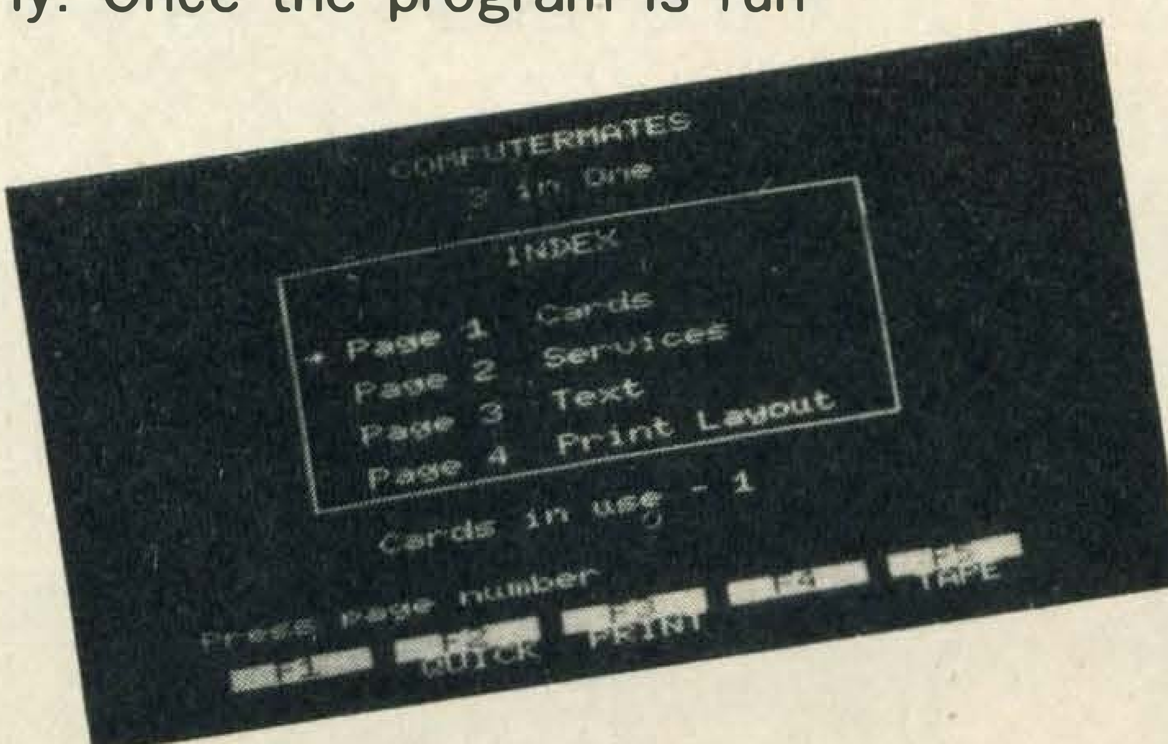
Entering information is extremely simple. As well as the text actually on the card, the various headings down the side, such as address, telephone number, and so on, can be edited in an instant.

Being on cartridge the program runs straight away. That's important as you usually want to get to the information quickly. Once the program is running, however, you still have to load in the data. This can be quite slow if you're using cassettes, so a disk drive is recommended for this.

One particularly useful feature is the facility to hit a function key and obtain a quick printout of the card on the screen.

There is, of course, a search facility. What marks out this program is the speed at which the search operates. It's almost instantaneous — very impressive.

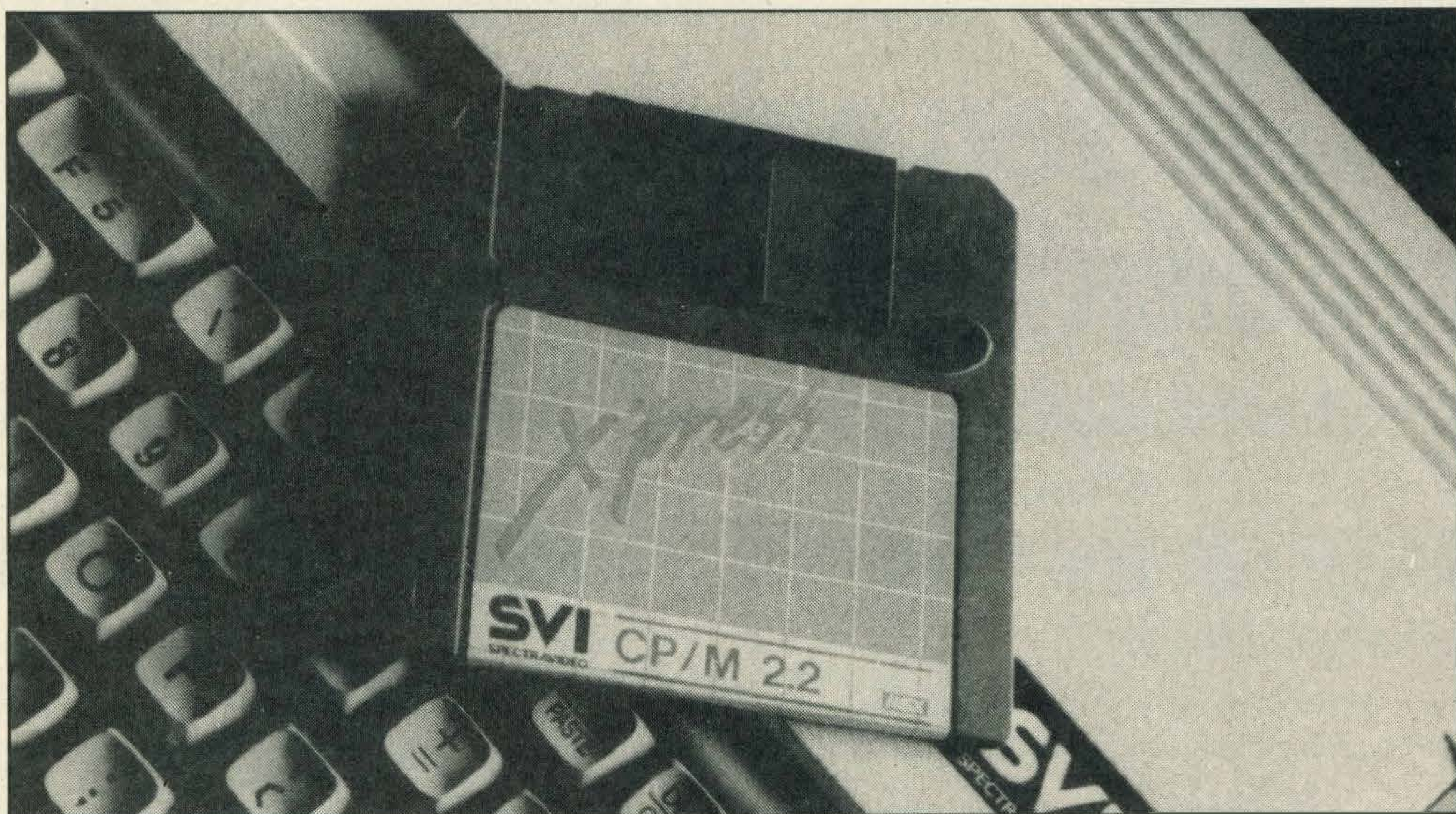
Like the other Computermates programs, *Cards* is aimed at the serious user — hence the price. But it's worth every penny.



10

CART: £39.95

SMOOTH OPERATOR



A huge selection of business software is now within the grasp of MSX users. We find out why

After having spent months being bewitched, battered or bewildered by the excesses of computer terminology, the last thing that you will want to do is step into the murky world of the Disk Operating System (or DOS if you collect acronyms).

However, if you own a floppy disk drive, or are thinking of buying one, the chances are that you will find an operating system lying in wait for you in the box.

So what is an operating system? An operating system looks after all those nasty bits of hardware leaving you to get on with the task at hand. In fact, most of the time, you don't even know that it's there.

Occasionally, you may want to copy a disk or some files, or format a disk (initialise the disk so that it may be read from, or written to by the operating system) but that is normally most of what you need to know. Unless, of course, you feel like experimenting.

The operating system is probably far more important to the programmers than it is to program users, despite all the ballyhoo about how important it is for an operating system to be user-friendly.

The DOS sits between the hardware and your programs, looking after your files, printers, RS-232 ports, and indeed any resource which may be attached to your computer. It organises your floppy disks, fetches information for you, and generally makes the computer more acceptable as a tool of work, rather than some confusing collection of silicon chips.

It's worth tracing the evolution of operating systems by looking right back to the 1950's — the stone age of computers.

In those days, programmers needed to be technicians as well, often fiddling with the hardware more than actually programming in the language of the day — FORTRAN.

He would spend much of his time shuffling punched cards, which were used to enter programs and data (nothing as sophisticated as VDUs and keyboards then!), often loading and reloading programs until all the bugs were ironed out.

After a few years of this tedium (around 1960), steps were taken to automate some of this manual work to make the programmer's life a little easier. Simple operating systems were born — deriving their name from the fact that they helped 'operate' the computer for you.

Over the next decade or so, more and more tasks were taken on by increasingly sophisticated and powerful operating systems. The net effect of this progress was to 'insulate' the computer user from the hardware — all that they really needed to know was how to use the operating system, the hardware held much less interest for them.

These computers were all very large (mainframes) and *very* expensive. The man on the street had to wait until the 1970s for the arrival of more affordable computers.

The semiconductor giant Intel produced the world's first microprocessor chip, the i4004, which was — believe it or not — a four-bit computer! Originally designed for use in calculators, its potential in other applications, such as simple industrial controllers (in a washing machine for example), was soon realised.

The 8-bit i8008 arrived in 1974, a device designed for use in computer terminals, to be followed by the chip that really started the microprocessor revolution — the i8080. This chip has had many descendants, including the Z80 found in MSX computers,

and the 8/16-bit 8088 found in the IBM PC, amongst others.

The MITS Altair became the first microcomputer system and what was to become Microsoft BASIC was developed for it.

Peripheral technology was also progressing in leaps and bounds at this time. A number of companies, notably Shugart, were developing floppy disk units to replace slower and less reliable cassette systems.

In 1974, Gary Kildall, then a consultant at Intel, produced the basis of what was to become CP/M (Control Program for Microcomputers).

CP/M spread throughout the microcomputer industry like wildfire, becoming the *de facto* standard for 8-bit microcomputers. It is still very much alive today, offered on a large number of computers including the Tatung Einstein and now MSX (on the Spectravideo X'Press).

Not only does the system 'manage' your computer for you, but it also supplies a number of utilities including an editor to create programs, and an assembler and debugger for machine code buffs.

'One of the beauties of CP/M is that the user interface looks the same on all computers running CP/M'

A huge number of programs have been designed to run with CP/M, including Wordstar (wordprocessor), DBASE II (database) and Multiplan (spreadsheet).

Some programs deemed in the public domain (that means, not copyrighted — for example Bach's music is public domain) are available free to CP/M users.

One of the beauties of CP/M is that the user interface looks the same on all computers running CP/M, no matter what hardware difference there may be. For example, CP/M 2.2 on a Tandy TRS-80 will appear to be identical to CP/M 2.2 on the Spectravideo X'Press, even though the computers have totally different hardware.

This 'hardware independence' is also seen in MSX-DOS. Tim Patterson designed PC-DOS (itself derived from MS-DOS) the operating system for the IBM PC, so was the natural choice to provide the operating system for the new MSX computers.

When the first 16-bit microprocessor became available, instead of waiting for the arrival of CP/M-86, he wrote his own version of CP/M, which was later to evolve into PC-DOS. MSX-DOS acknowledges the importance of both CP/M and MS-DOS, and has fused them together.

What has resulted seems to be basically CP/M with a user interface that looks like MS-DOS. One of the criticisms of CP/M was that it wasn't particularly user-friendly, offering an array of mind-boggling error messages.

MSX-DOS is a fair bit more pleasant to use in this respect, presenting a more informative and helpful face when things go wrong. The basic CP/M and MSX-DOS commands are given in the table below to give you some idea of the differences.

MSX-DOS provides a high degree of compatibility with CP/M 2.2, so programs designed for CP/M 2.2 *should* run on MSX-DOS systems. We have not yet tested this compatibility, so if you want to buy CP/M programs for MSX-DOS, remember: *always try before you buy!*

CP/M 2.2 COMMAND SUMMARY

ASM	Run the Assembler program
DDT	Load and run the debugger
DIR	Displays directory
DUMP	Display file in hexadecimal
ED	Edit a file
ERA	Erase file
LOAD	Load a program
MOVCPM	Create a copy of CP/M
PIP	Perform file operations, e.g concatenation, copying, case conversion etc.
REN	Rename file
SAVE	Save a file
STAT	Give status of various devices and files
SUBMIT	Cause CP/M to accept commands from a file instead of console
SYSGEN	Create versions of CP/M
TYPE	Display contents of a file
USER	Set user number

MSX-DOS COMMAND SUMMARY

BASIC	Go to MSX-BASIC
COPY	Copies file(s)
DATE	Displays and sets date
DEL (ERASE)	Deletes file(s)
DIR	Displays directory
FORMAT	Formats a floppy disk
MODE	Sets screen width/mode
PAUSE	Sets a pause in a batch file
REM	Allows a comment in a batch file
REN (RENAME)	Renames a file
TYPE	Lists the contents of a file

The way that MSX-DOS organises its data on disks (the disk format) is supposed to be identical to that of MS-DOS, which in theory should allow data (not program) exchange between your humble 8-bit MSX system and the more powerful 16-bit MS-DOS computers like the Apricot.

Bridge

This would allow you to set up a 'bridge' between office and home. Imagine slaving away with *Wordstar* on an Apricot all day at the office, and you're still not finished by 5.30. So you save your document on disk, take it home with you. Retrieving your MSX computer from the hands of a crazed alien zapper, you start up your MSX-version of Wordstar, retrieve your document from disk, and carry on working from where you left off. We've yet to test this feature, but if it works it's a lovely idea.

The version of MSX-DOS we saw was a little disappointing, being very much a poor relation to MS-DOS. Many of the utilities expected are absent, such as the M-80 assembler, the very useful CHKDSK (which checks your disk), DISKCOPY (copies an entire disk), and EDLIN (an editor).

The TIME function which is used to set the system's clock did not work on either the Spectravideo or Toshiba HX-22 systems we tried. This is because the internal MSX timer may be temporarily stopped when some input and output operations are carried out.

'If you want to buy CP/M programs for MSX-DOS, always try before you buy'

Hopefully, later versions of MSX will correct this feature. Another missing feature is the promised 'tree' directories, which turn your disk into a kind of multi-level filing cabinet.

It is possible that the Spectravideo MSX-DOS is preliminary, but the documentation looks fairly complete. Most of the 'missing' features may probably be added in later versions of the operating system. The current version is, after all, version 1.00!

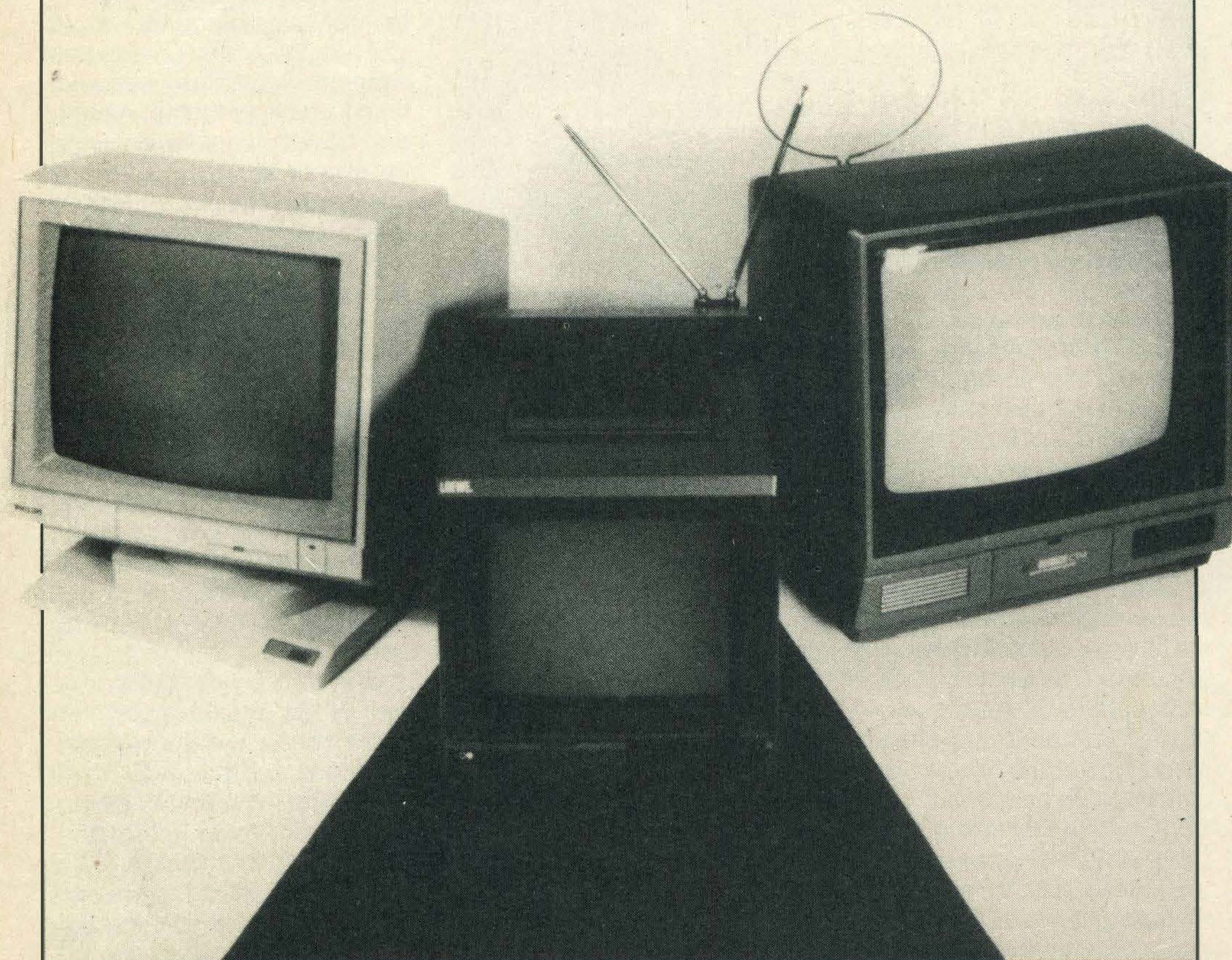
When both MSX-DOS and CP/M become widely available for MSX computers, we should see a range of proven and well supported business software being made available. A number of MSX computers seem to have been designed with some business use in mind; the Sony and Pioneer models are excellent examples due to their keyboards which are particularly good for word-crunching.

Those who are more orientated towards programming will be offered the chance to explore new languages when compilers become available. BASIC, COBOL, FORTRAN, and Pascal compilers are promised from Microsoft themselves, with the possibility of LOGO, LISP, and C from other suppliers.

Life with an operating system is as simple or complicated as you wish to make it. You don't need to delve deep into using them, but if you do, you may find it very interesting. Without them though, life could be very difficult. Just think about all those punched cards! ■

CAREFUL SCREENING

Buying a computer monitor is no easy task — Sally Wood lends a helping hand



There comes a time in any self respecting MSX computer owner's career when the purchase of a monitor will be considered. It's not a matter to be taken lightly — the path to buying a suitable monitor is a hazardous one and the first thing to establish is whether you really do need one.

Isn't the family TV set enough? The chances are that it won't be. Family TVs are always the scene of fights as Grannie and kid sisters battle it out in the living room just to decide whether its going to be *Bugs Bunny* or *Coronation Street* tonight.

You and your computer won't stand a chance of even playing a quick game of Konami's *Tennis* never mind programming your latest epic game. Even if you do get to the set, the TV picture is fuzzy, flickers and will drive your eyes bananas after a while. If this situation sounds familiar, then an alternative VDU source is needed — a monitor.

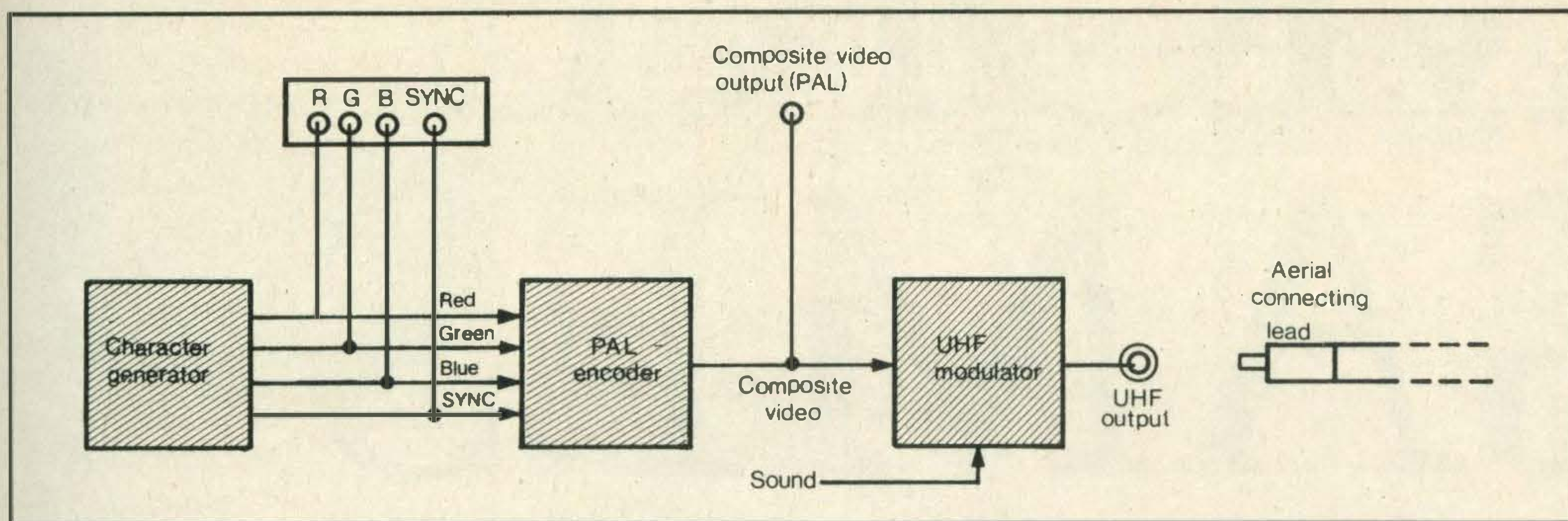
A bewildering task awaits you. Monitors come in all shapes and sizes and can be divided into five main groups; monochrome, TV/monitors, standard, medium and high resolution monitors. Despite these fairly clear cut categories, there are many variables involved in buying a monitor.

Manufacturers tend to interpret standards differently and although some things, such as the screen display quality, rarely vary, some models will include extras such as SCART sockets, anti glare screens and remote control units for the same price as a similar monitor which lacks these features.

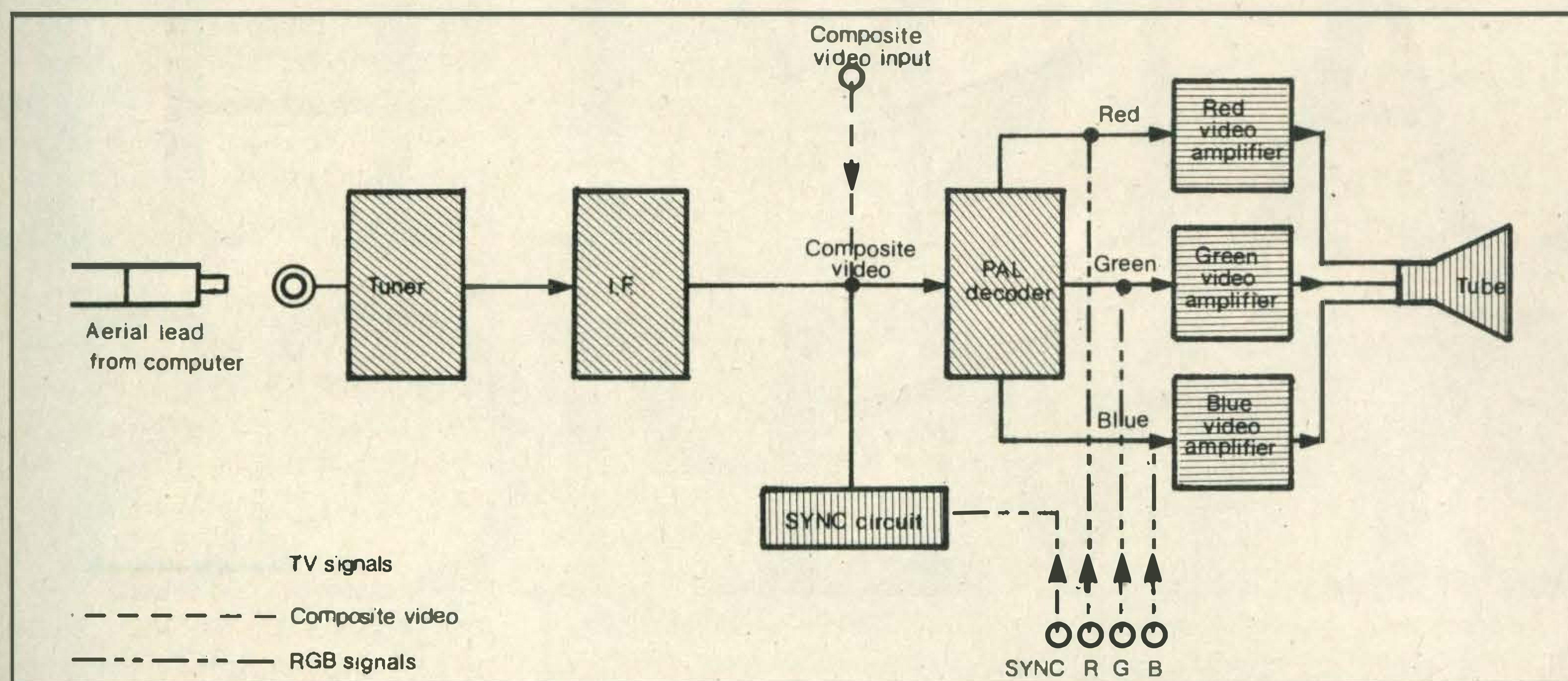
There are hundreds of monitors lurking about in shops and somehow you've got to negotiate the obstacle course of buying one; inflated prices, poor shop selection, and assistants who know even less than you do.

Home computers are usually used for the following; playing games, word processing, as a business tool and for programming. Consider which of these applications you intend to use your MSX for and you'll be half way to choosing a model.

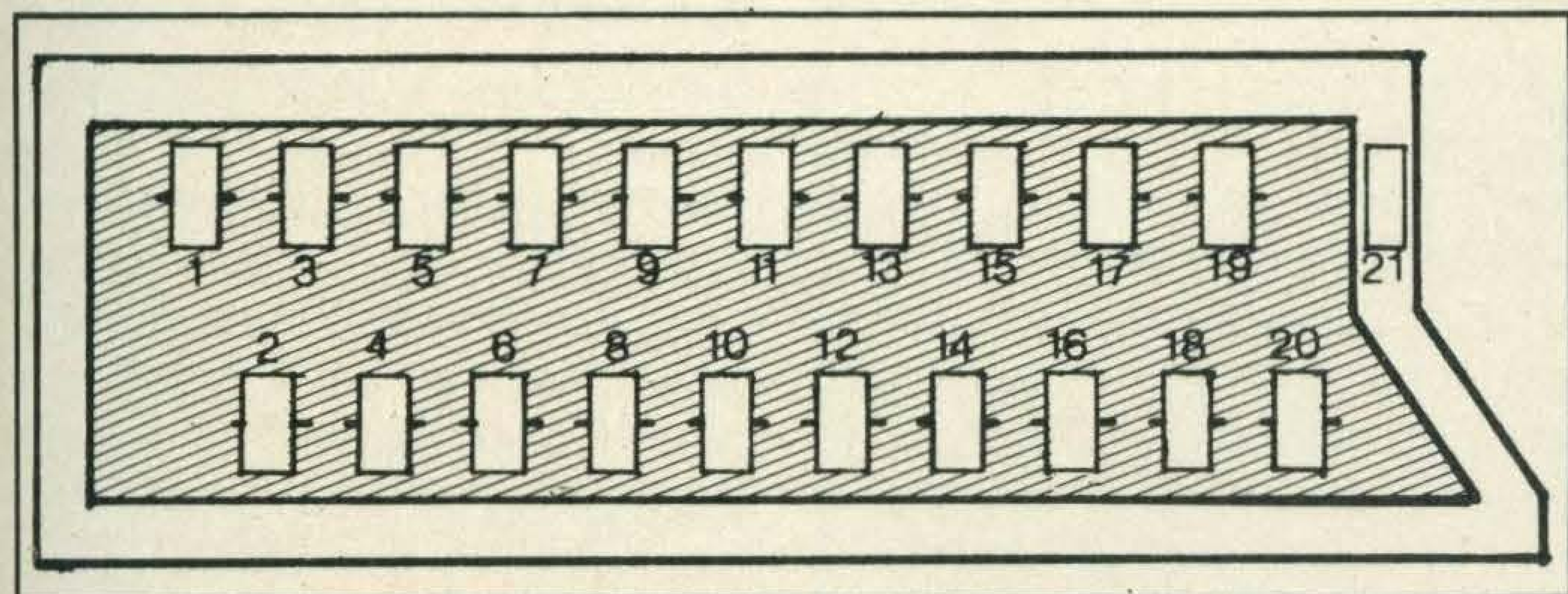
This is because some monitors are more suitable for certain applications than others, for instance whereas a lower quality monitor might be



The encoding process in a computer

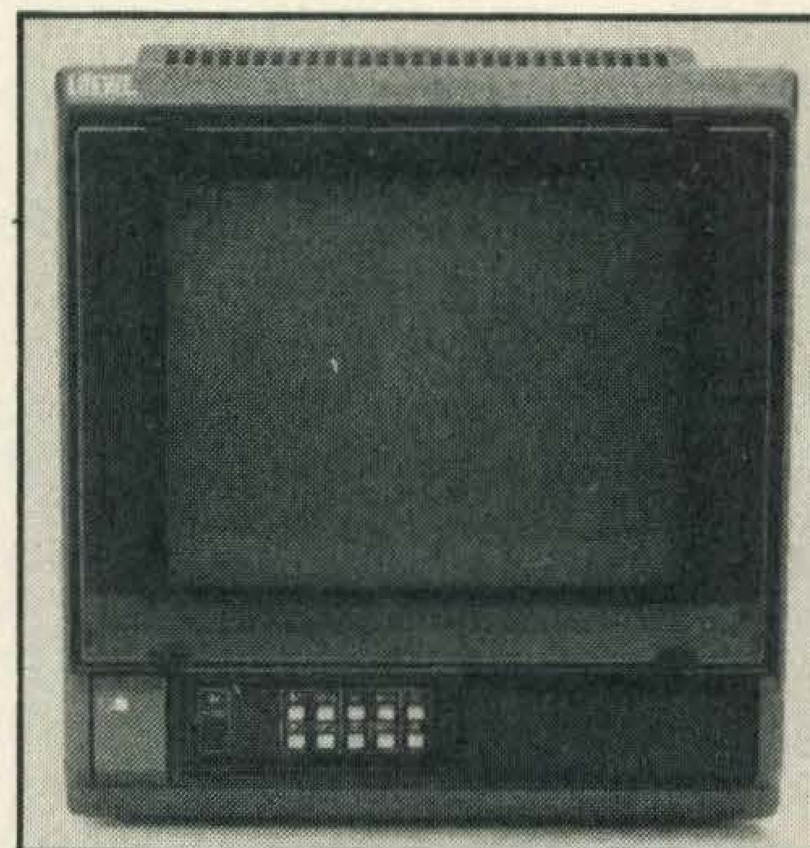


Signal conversion process in a TV/monitor



Pin configurations for Loewe's SCART socket

1 —Audio right out	**8 —Switching voltage**	**15—Red signal**
2 —Audio right in	**9 —Green ground**	**16—Blanking**
3 —Audio left out	**10—Not connected**	**17—Video ground**
4 —Audio ground	**11—Green signal**	**18—Blanking ground**
5 —Blue ground	**12—Not connected**	**19—CVBS out**
6 —Audio left in	**13—Red ground**	**20—CVBS in**
7 —Blue signal	**14—Not connected**	**21—Shielding pin**


Loewe's portable MCP110 TV/monitor can even be used off a car battery. At £375, it features a 'flat' display which doesn't suffer the distortion normally associated with TVs and monitors.

fine for games, it will have little use for word processing.

Monochrome monitors can be picked up for under £100 and are usually available with either amber or green screens. The display is particularly good for word processing, programming and business use although virtually useless for games.

These monitors offer incredibly good value for money and our advice is that if you intend to use it for the more serious side of micro life — buy one. We've tried the £89 Philips 7522, a 12 inch model available in both amber and green screens and found that it gives excellent results.

Monitor resolution governs the quality of a monitor's display. It refers to the ability of a monitor to clearly display a number of pixels or computer defined dots. Pixels are the units which make up the graphics or text images on screen and the higher their density, the better the quality of visual display.

Resolution is related to the pitch size. This is the distance between adjacent groups of phosphor dots on the tube, and is affected by the tube size. For example, a 14 inch monitor with a 0.6mm pitch will resolve 450 pixels per horizontal line whereas a 20 inch tube with a 0.8mm pitch resolves 500 pixels — the increased screen size allows more phosphor dots to be laid down.

Whatever the screen size, a standard monitor will only produce a display good enough for a 40 column screen. That's great for games, but not terribly good value as for a few pounds more it is possible to get a TV/monitor, combining the standard monitor facility with a TV.

Even so, the brand new Philips CM8524 at £265 is a good example of a standard monitor, but has enough additional features to push it above the average standard monitor and even above a TV/Monitor. These include a stylish swivel stand, anti-glare screen, built-in quartz clock, display centering control and, perhaps most importantly, it has a green screen option.

Flicking the green screen switch changes it to a monochrome screen, automatically turning the monitor into a viable contender for the business and programming market.

Sanyo's CD3195B is another tried and well liked standard monitor with a green screen option, but retailing at £360, it is £100 more expensive — it pays to shop around!

Next up is the medium resolution monitor. A 14 inch tube with a 0.4mm pitch resolves about 580 pixels a line which means that 80 characters a line can be resolved — just.

Microvitec's Cub 1451 AP/MS is an example of this type and is in constant use, here in the *What MSX?* office. We use it to review games and for large amounts of word processing, and it has always produced excellent results. There's very little eye strain, often a problem with lower resolution monitors.

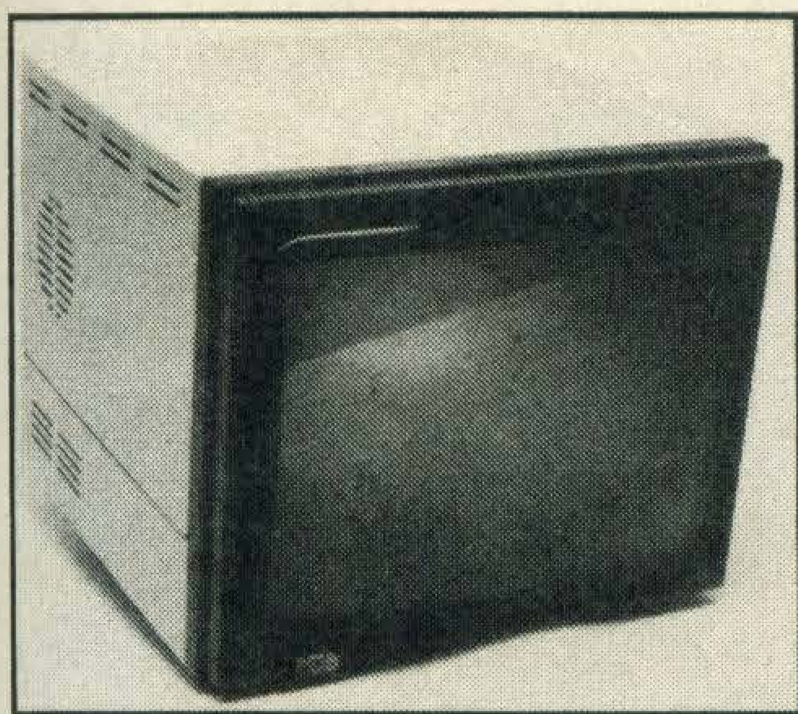
'Hi-res monitors are the best but the price puts them beyond the reach of most home computer users'

High resolution monitors are the best, but their price, often £450 or more, puts them beyond the reach of most home computer owners — unless they've just won the pools or it's intended for business.

A 14 inch unit has a pitch of 0.31mm and resolves around 800 pixels, perfect for 80 character use.

We've already touched on TV/monitors. Buying one of these should be considered carefully because there are some excellent bargains on the market at the moment.

Up until this year, most of the TV/monitors combined a TV facility with a standard monitor display. But Loewe Opta, a German company which has recently started to sell its products in the UK has changed that with the introduction of the medium/high resolution 10 inch MCP 110



The Microvitec Club

KT, a portable TV/monitor.

In addition to the clear, flicker free, well saturated colour display, the picture is completely flat due to the Flat Square Tube (FST). Most monitors utilise a curved tube which distorts the pictures, especially at the sides.

Advantages of the FST, besides the warp-free picture, include a brighter and bigger (more of the display fits into the screen) picture. Some of the latest Grundig models incorporate FSTs.

All other TV/monitors that have passed through our offices — Philips CT2007 at £230, Fidelity's CTM 1400 at £220 and Ferguson's MC01 at £230 — have had a standard display.

Resolution is one type of variable. The type of signals a monitor receives is equally important. There are three main signal types: Red, Green and Blue (RGB); PAL composite video (CVBS) and radio frequency (RF).

Understanding the different processes these signals go through before ending up on the screen helps to explain why images generated on a TV screen shimmer and go fuzzy at the edges whereas monitor displays are much clearer and steadier.

MSX computers generate two types of video signal; RGB signals where three component colours — red, green and blue are generated separately and the CVBS signals in which the three RGB signals are combined with a synchronising signal — the Sync. The latter is most common. Only the JVC, Toshiba HX22 and Sony Hit Bit generate RGB signals.

A TV, though, can't receive the MSX generated CVBS signal via the RF socket until it has been converted into an RF signal. Once inside the set, the RF signal is changed back to the CVBS signal via an Intermediate Frequency (IF) signal and then again back to separate RGB signals. These are then used to drive the video amplifiers and finally, the tube.

With all the encoding and decoding it's hardly surprising that the resultant TV display is so awful. A monitor bypasses this tedious and inefficient process.

A monitor's CVBS socket will take the composite video signal as it is, separating it into component colours once inside. Most efficient of all three, however, is the RGB signal which remains pure and unadulterated from computer to monitor screen.

If you intend to utilise both the RGB and composite video signals, make sure the monitor has both these ports — not all of them have.

Euroconnectors (or SCART sockets) are a type of socket combining the RGB and CVBS signals into one port. They are becoming an increasingly common feature on monitors — Loewe MCP110, Fidelity CTM1400, Philips CM8524 all incorporate the SCART socket.

The idea of the SCART socket is, according to Tim Thomas, Philip's Technical Product Manager for computer monitors, 'to have one socket on the back covering all options.'

Apart from covering the computer's audio input/output, and CVBS input/output, the SCART socket enables video and audio cassette recorders and video cameras to attach to the one socket using different pin configurations.

'One of the advantages of a single socket,' Thomas told us 'is that it cuts out the spaghetti syndrome familiar to hi-fi and computer users — lots of wires all doing different things.'

Euroconnector plugs can be purchased from most specialist shops for about £20, although our local specialist shop refused to make a SCART lead for us claiming that all SCART connections were different from each other. Even if true, this shouldn't cause any problems as detailed diagrams of the sockets are included in monitor manuals.

Philips doesn't take any chances with its new CM8524. It includes a SCART as well as individual RGB and CVBS sockets.

Picture controls vary from monitor to monitor. All of them, including monochrome monitors, have volume, contrast and brightness controls.

An interesting control on the two Philips monitors — the monochrome 7522 and the colour CM8524 — is an image centering function. A few TV/monitors such as Loewe's MCP 110 are accompanied by a remote control unit.

Anti-glare screens are included on many of the upmarket models — these help to reduce eye strain caused by the picture brightness.

By now, you will have a clearer picture of what sort of monitor you want as well as the sort of features you'd like it to have. You won't bat an eyelid when shop assistants try to blind you with talk of green screen options, SCART sockets and CVBS signals.

Our *Buyer's Guide* at the back of this issue will give you some idea of availability and prices, but the golden rule is of course to go and see for yourself.

MONITOR APPLICATIONS

MONITOR TYPE	GAMES/ GENERAL USE	TEXT/ BUSINESS	PROGRAMMING
MONOCHROME	0	2	2
STANDARD RES	0	0	0
MEDIUM RES	2	1	2
HIGH RES	0	2	1
STANDARD TV/MONITOR	1	0	0
HIGH/MED TV/MONITOR	2	2	2

KEY: 0 — Not recommended
1 — Good
2 — Excellent

NOTE: These ratings are subjective as they take a number of aspects into account, including price.

WHAT TO LOOK FOR

Here are ten basic points to consider when buying a monitor:

1. Consider what applications you will use your computer for and choose the type of monitor display carefully. In most cases, you get what you pay for.

2. Make sure it is compatible with your MSX.

3. If the computer is connected to a TV/monitor via the RF socket, you will only get a TV quality display.

4. If your MSX has an RGB facility check that the monitor has both CVBS and RGB sockets.

5. Monitor sound outputs can often only be heard if the correct leads are attached.

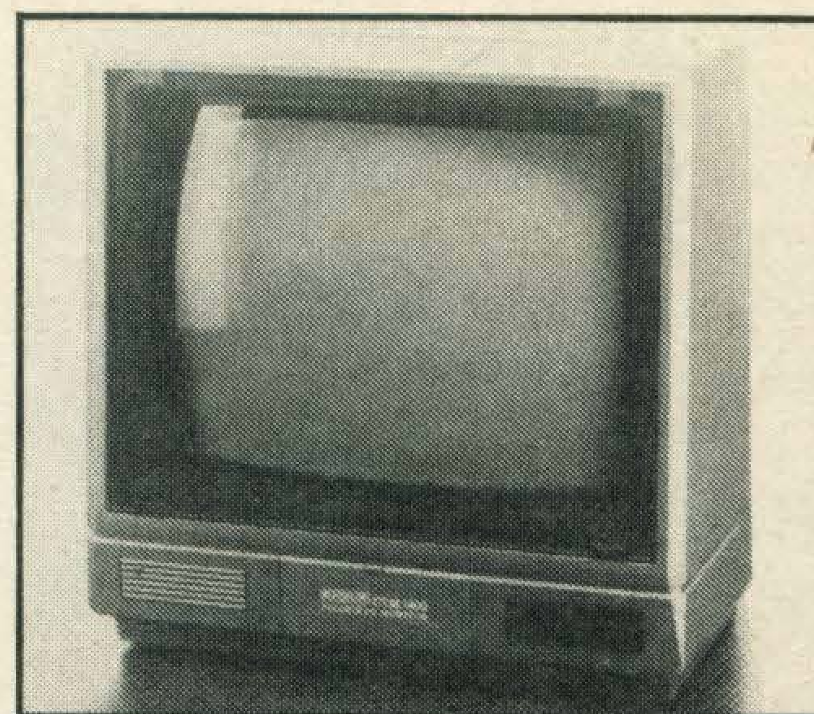
6. FSTs are good value as they produce a distortion-free, larger and brighter picture.

7. Consider the size of screen. 14 inches is the optimum size for home computer applications.

8. Portability may be an asset. Some monitors are more portable than others.

9. Make sure you like the style and colour — you're the one who will be staring at it.

10. If you want features such as green screen options, remote control or swivel stands, ask for them.



Fidelity's colour TV/monitor

GETTING INTO PRINT

Turning your bits into printed words is easy. But choosing the right printer to do it needs some thought and considerable care

Whatever the reason you buy your computer for in the first place, chances are you will at some point want to produce a hard copy — or printout — of your precious work.

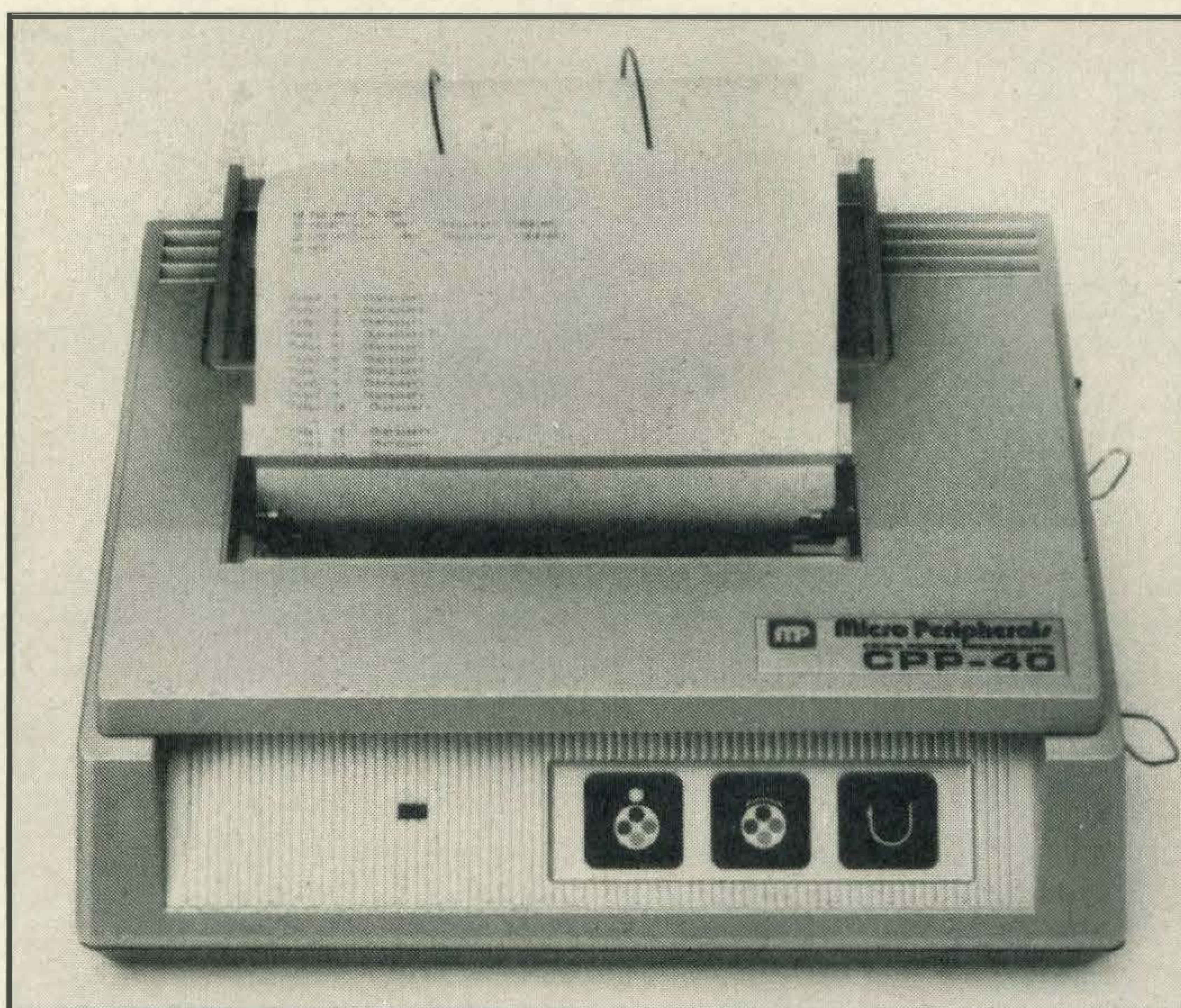
If you're a crack programmer you will want a fairly cheap printer to print out your listings, to help with debugging and for graphics — maybe, even, in colour.

If you want to word process you will want a better quality of print for letters, address labels and suchlike — speed is not as important here as quality.

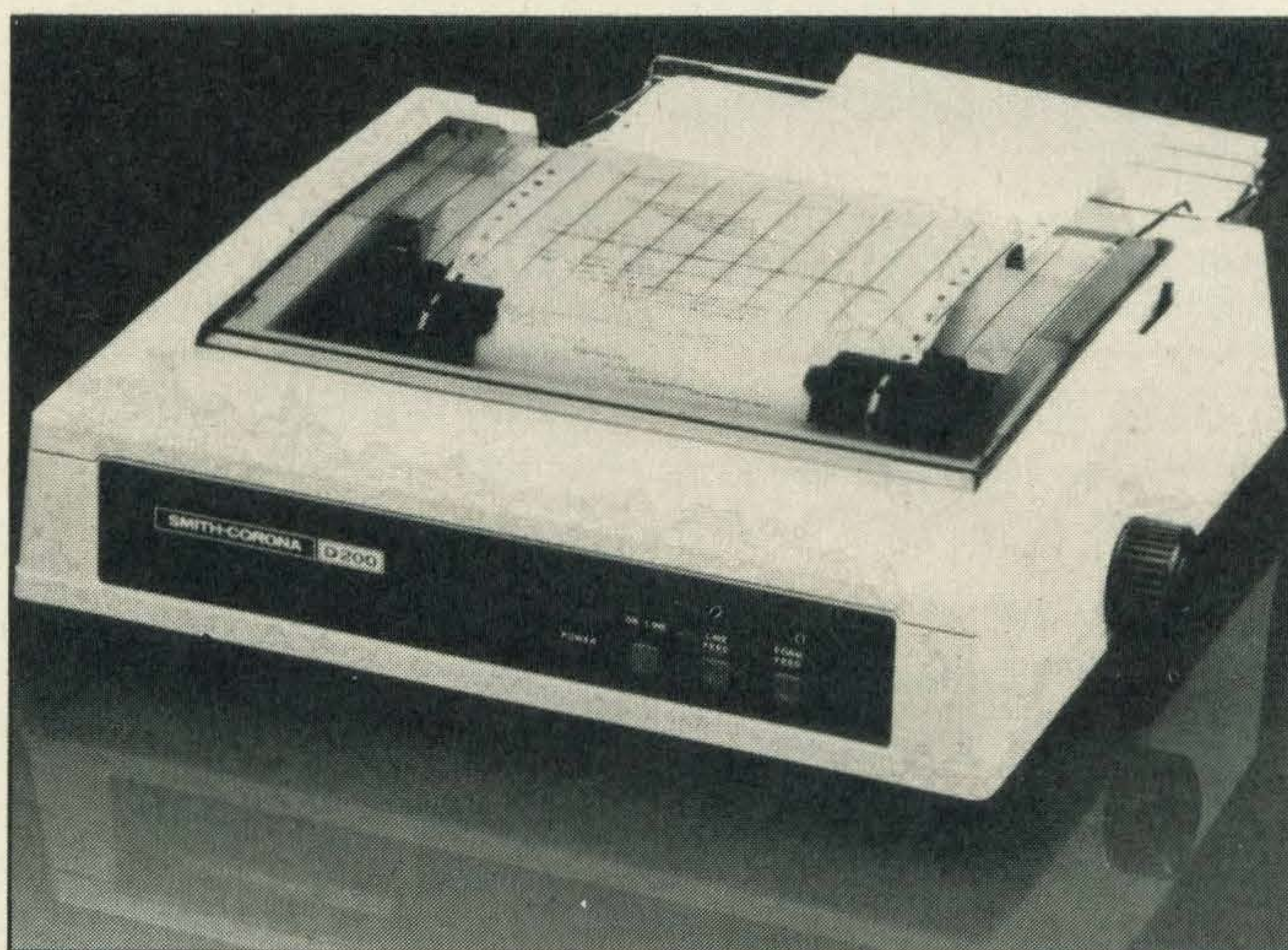
If you're using your MSX computer in the office you'll want a fast, efficient, high quality printer to produce reports, data sheets, form letters and so on.

The price of printers may come as a bit of a shock to many users — they can easily cost as much as the rest of a system put together.

The message, then, is clear; decide exactly what you intend to use a printer for *before* you start looking around. Otherwise you could either end up paying more than necessary for quality you don't really need, or buying too cheap a printer which just can't cope with your workload.



The CPP-40 is a tiny but impressive four colour printer plotter — and cheap



A typical dot matrix, Smith Corona's D200 gives a variety of typefaces

To help you with the decision, we'll run through the various types of printers available, starting at the low-cost end and working up.

Once you get an idea of the kind of printer you need — and how much you're prepared to pay — turn to our buyer's guide to printers on page 100 for more specific details.

Dot matrix

The cheapest printer you'll find — at around the £100 mark upwards — will probably have a dot matrix print head, which forms characters by impact against an inked ribbon, or by thermal means on specially coated paper.

The printhead contains a column of several tiny pins — usually 7 or 9 — which are thrown against a ribbon as the printhead moves across the carriage. The dots thus formed build up into characters as the printhead moves from left to right (and right to left on more sophisticated models) across the page.

Impact dot matrix printers can be pretty noisy, but thermal models are practically silent since characters are formed chemically rather than by force.

The more pins you have in the printhead, the more dots that make up each character. This means that there's less space between the dots and the character is much clearer to read.

The less you pay, the poorer the quality of print you can expect and the slower the speed — as low as 30 to 40 characters per second around the £100 to £150 price mark.

If you pay more you can expect a faster, more versatile machine for your money. For instance, bi-directional printing, which considerably speeds up the whole process, is a useful feature.

Dual mode printing is also very useful, especially if you sometimes want high speed printing and at others high quality print. With a dual mode printer you can select between low speed, 'near letter quality' or 'correspondence' quality print for letters and reports, and high speed, lower quality print for printouts and high speed dumps.

Near letter quality print isn't as good as daisywheel print, but even the lower speed is much faster than you could expect from a daisywheel.

Apart from text, dot matrix printers can reproduce graphics from your computer. Some do this by means of 'block' graphics, producing the required pattern using set characters from the printer as 'building blocks'. Others can reproduce an exact replica of whatever graphics you have created on screen — these are said to have high resolution graphics capability.

Ink jet printers

Moving slightly up-market, wecome to the ink-jet printers, a comparatively new technological development. These printers produce characters by means of squirting ink at the paper — again in a matrix of dots.

'The price of printers may come as a shock to many users – as much as the rest of a system'

Multi colour printing is often possible, with speeds in the region of 40 characters per second. Again, graphics are possible. A positive advantage of this kind of printer is that they are virtually silent, and produce a high standard of text and graphics. Expect to pay in the region of £500.

Daisywheel printers

If you are after electronic typewriter quality print for your computer-generated copy, you need a daisywheel printer.

They work a little like golfball typewriters, with all the characters on a print element that whizzes from side to side along the carriage.

The characters are held on the ends of 'stalks' emanating from a hub, giving the appearance of a flattened daisy.

As this element moves from side to side, the daisywheel spins, a hammer hitting each required character against the ribbon as it passes. More sophisticated models print bi-directionally.

Print quality is high, but you pay the price in speed and versatility. Speeds tend to be under 20 cps, and you are limited to the actual characters on the daisywheel — graphics are out. You can interchange the daisywheels, though, giving you a choice of several typefaces.

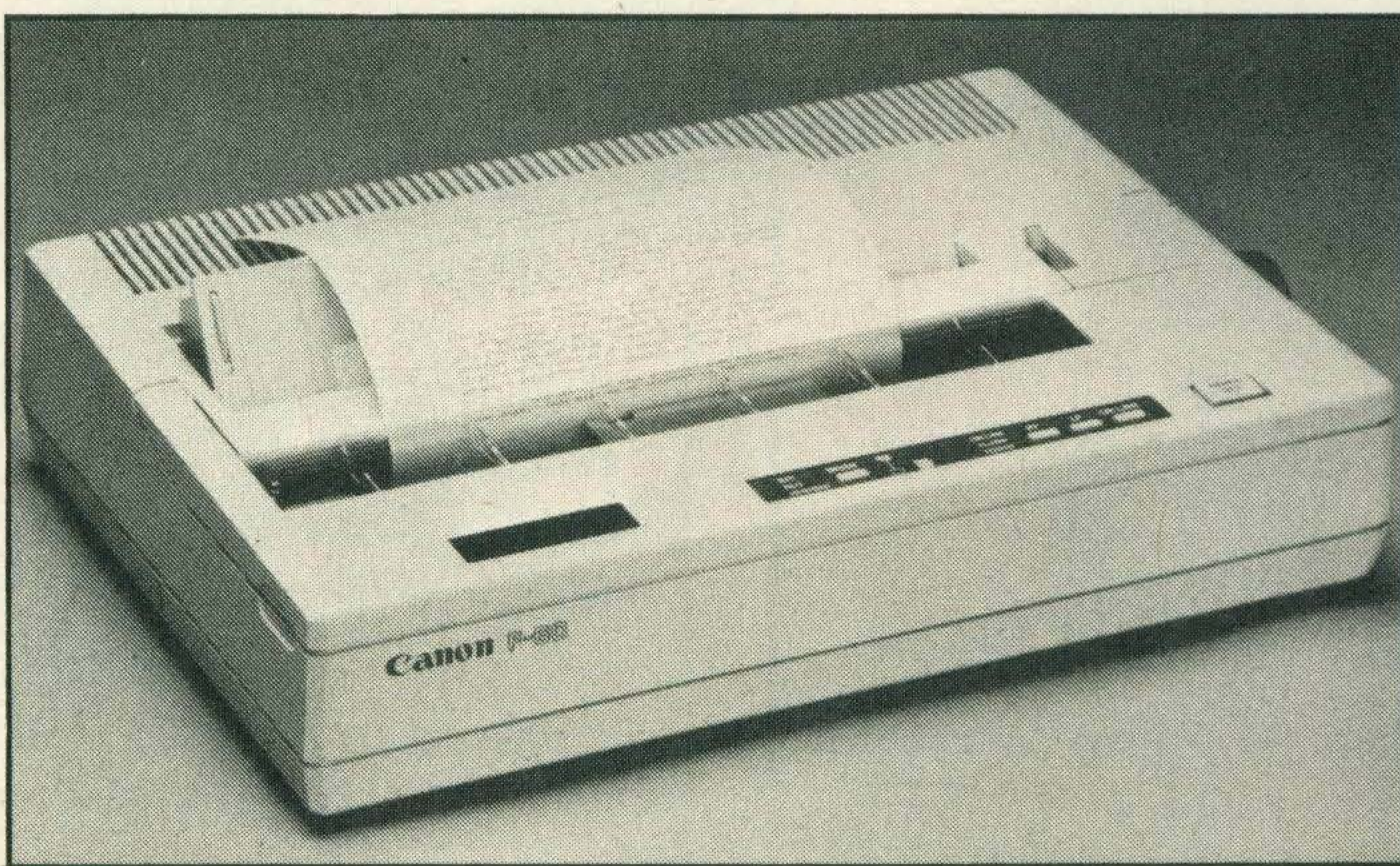
That's a summary of the different kinds of printers within reach of most people's budgets. But what else should you look out for in terms of useful features and add-ons?

First, consider what kind of paper you'll be using. If you're using single sheets or plain roll paper, you'll need a friction feeder, which works like the paper feed on a typewriter.

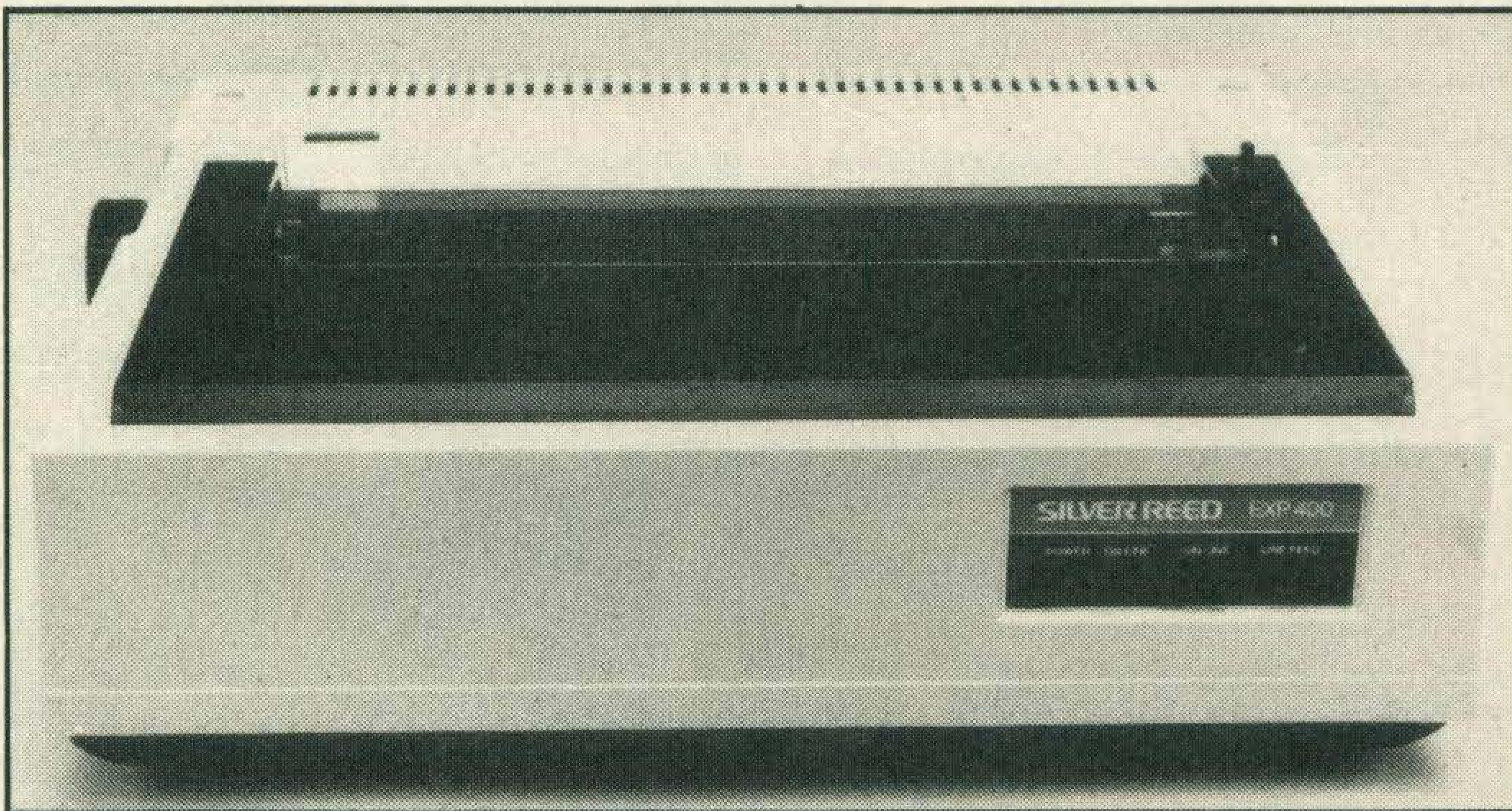
PRINTER CABLES

To connect an MSX computer to a printer with a Centronics parallel interface you need a printer cable with a 15-pin amphenol (MSX printer socket) to 36-pin amphenol (standard Centronics printer connection). These can be obtained as follows:

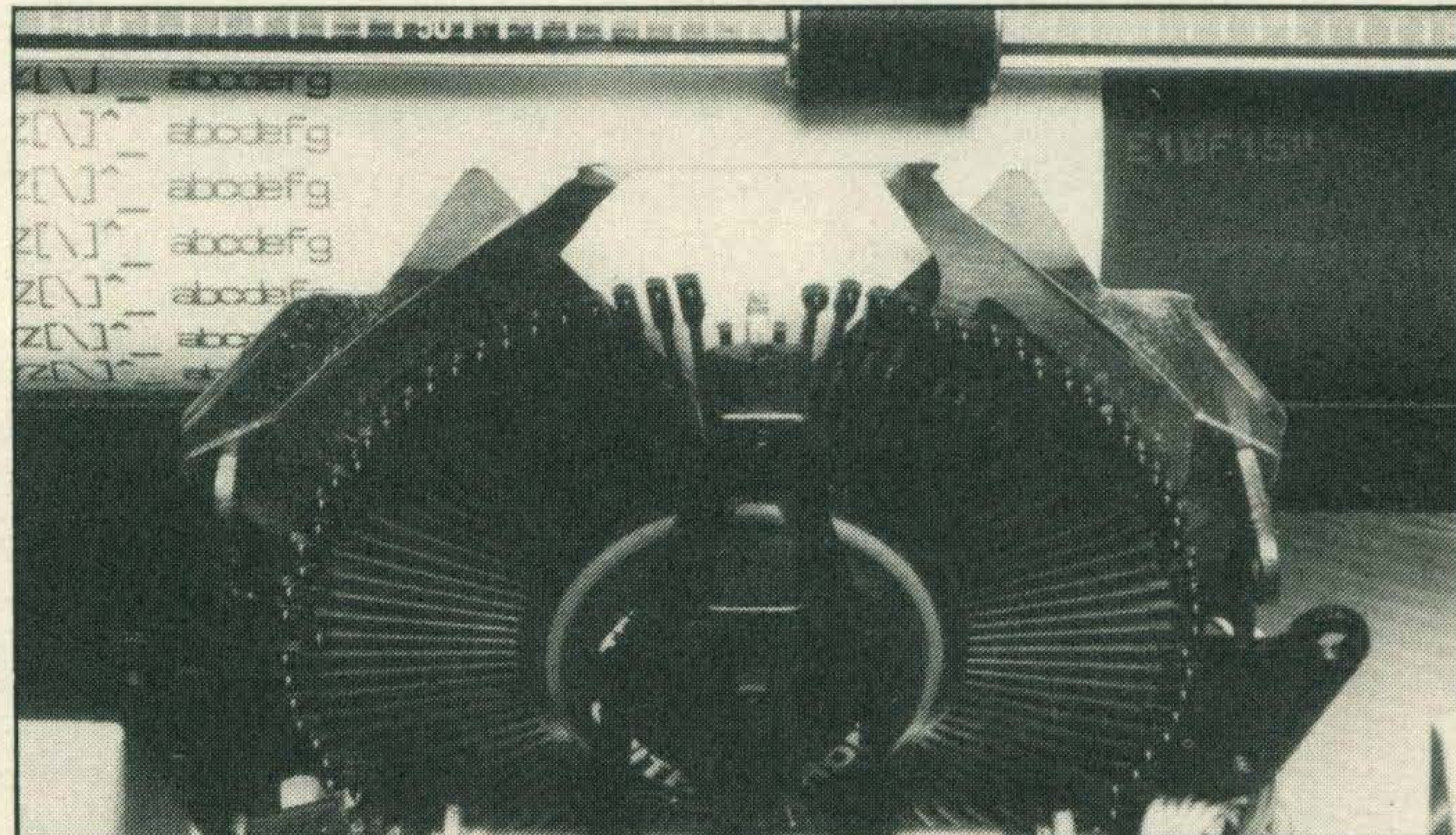
Micro Peripherals (0256) 473232	£12.80
Aztec Software (0924) 497319	£14.30
Doug Packer 01-941 2560	£15
Spectravideo 01-330 1010	£15.95
Boots the Chemist	£9.95



Canon's F-60 dot matrix printer has a very handy near letter quality mode



A daisywheel like this Silver Reed EXP 400, is ideal for quality print


A daisywheel close-up. You can change the wheel for different typefaces

Most daisywheel printers offer this type, although some can be fitted with a tractor feed, useful for continuous stationery. Also useful — but expensive — is a cut sheet feeder, which sits on top of the printer and feeds single sheets through one by one — saving a lot of fiddly messing about.

Tractor feeds come as standard on most dot matrix printers, and are designed for use with that familiar 'print out' paper with holes down each side. Tiny sprockets on each side of a roller catch these holes and pull the paper through the printer.

On most printers with this mechanism, the distance between the sprockets can be adjusted for different widths of paper, but where this distance is fixed the mechanism is called 'pinfeed'.

If you're worried about which printer will 'work' with your MSX computer, the rule is quite simple. Make sure the printer of your choice is fitted with a Centronics parallel interface. This shouldn't be difficult since it's the most widely used printer interface around.

You may find that a few graphics characters, specific to MSX machines, can't be produced by the printer of your choice, unless it is designated an 'MSX printer'.

But don't worry, you're very unlikely to miss these characters since they're only the odd graphics symbol not included in the ASCII character set — which most printers *can* easily reproduce.

You may also find that the cable supplied with the printer will not fit into the back of your computer. That is because the 'pins' in the interface are arranged in a non-standard format on MSX machines.

Either get your dealer to make up a cable for you or contact one of the dealers in our box above.

It is worth investing a few extra pounds in a printer which will print true descenders. This means that the printer will produce the lower portions of characters like 'g', 'p' etc, *below* the line like a typewriter. The cheapest dot matrix models won't always do this, printing the entire character above the line, which makes for pretty difficult to read output and quite generally headaches all round. ■

UnitSoft (MSX)



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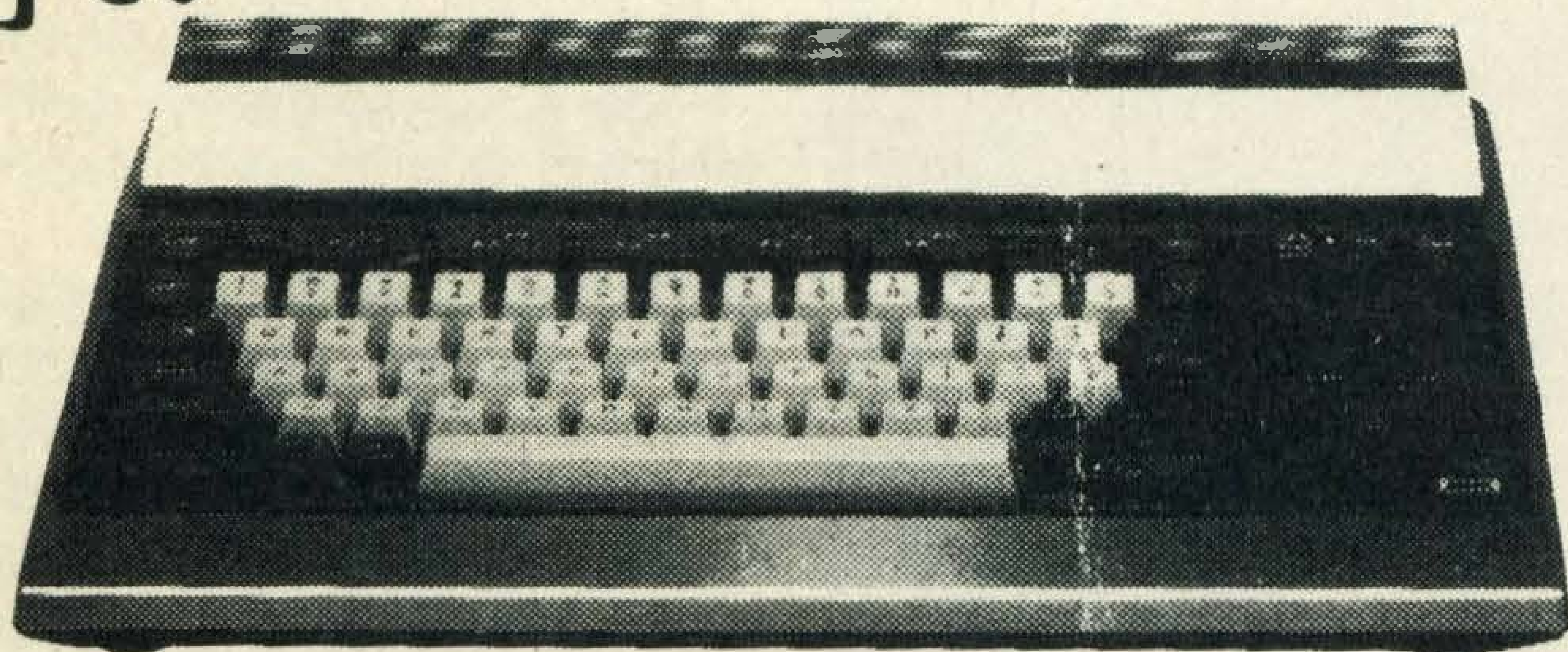
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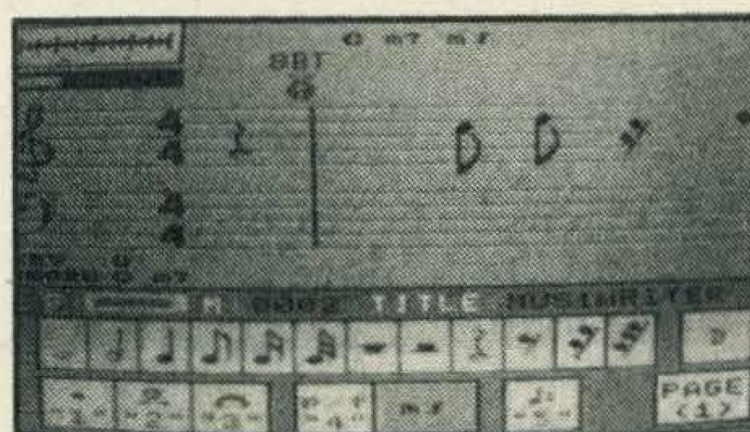
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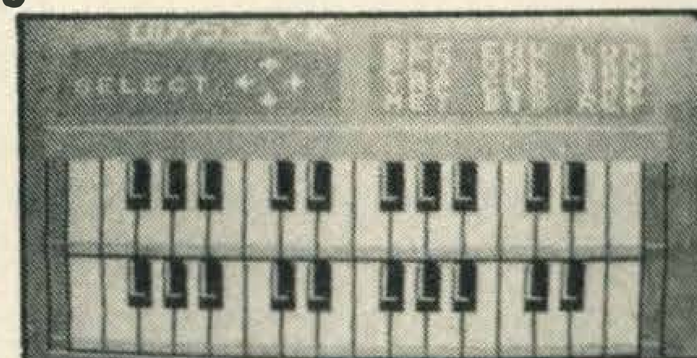
FM Musiwriter Cartridge for Yamaha CX5M



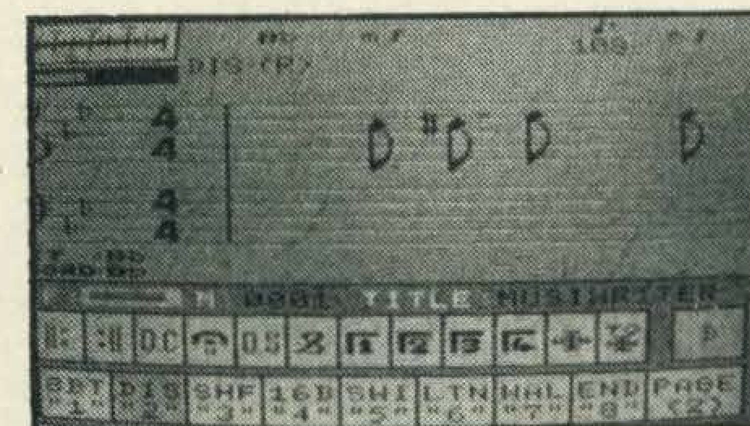
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SUPER SAVERS

If you want to use commercial software or save listings, you'll need a cassette/data recorder. But which should you choose?

A computer doesn't do much without software. But you need a medium to store the software on. And by far the most popular way of doing this is to use the humble cassette.

Cartridges are more convenient, but are comparatively expensive, and you can't use them to store your own programs or data.

Disks are better still in terms of convenience. But again the cost is high — especially when it comes to buying the drives themselves.

Cassettes are cheap and reliable, if a little slow at times. But it isn't just a case of wiring your computer up to your hi-fi cassette deck. You really need to have a tape machine permanently plugged-in to your micro.

This is when it becomes worthwhile considering a proper data recorder. These are intended specifically for computer use, and give a square wave (digital) output, for greater reliability.

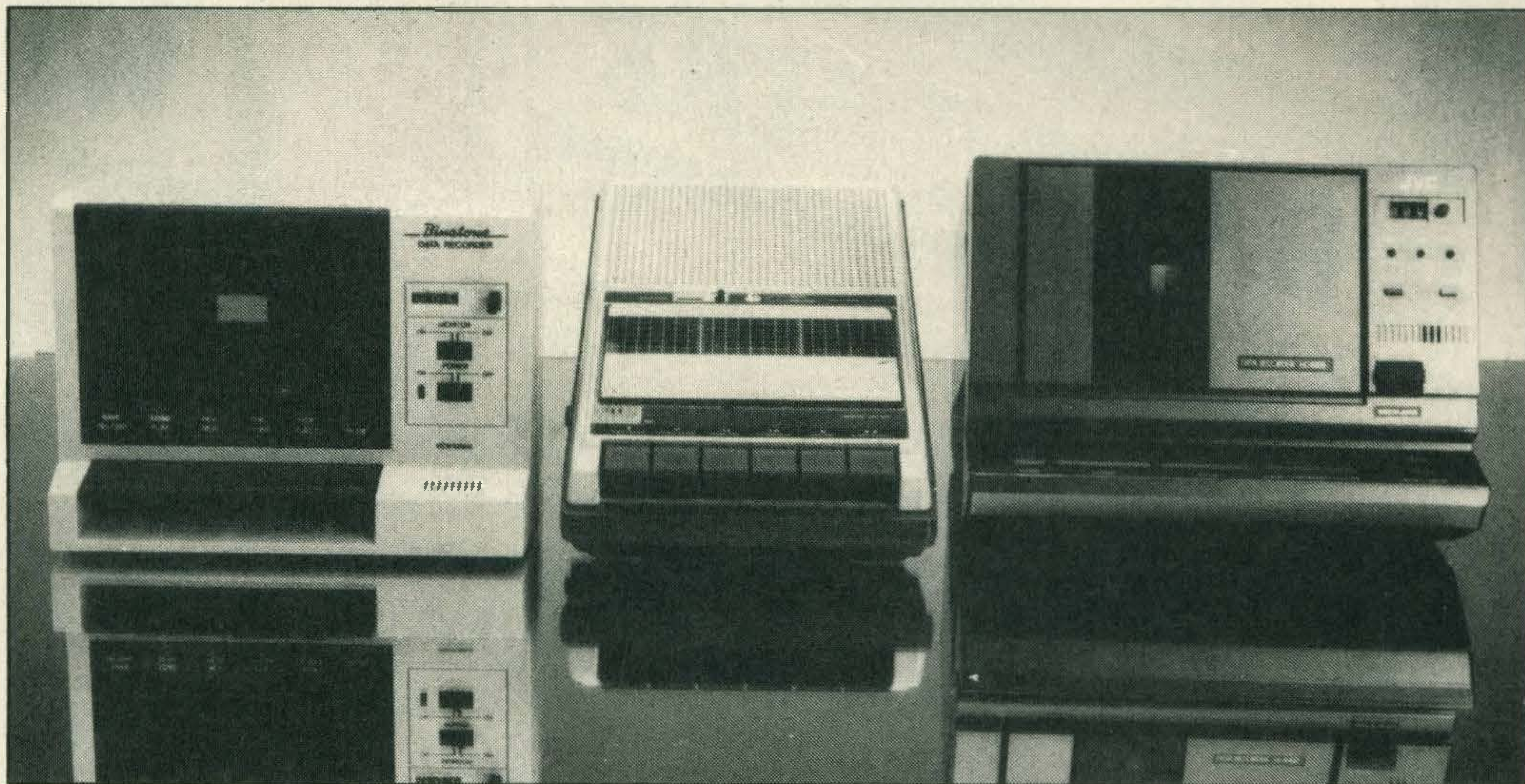
Although normal cassette recorders can save you money they may not serve you right. You may have to waste valuable computing time twiddling with various knobs and switches and altering the volume control.

Computers can be very temperamental, to say the least, about the quality of sound, and won't accept a program unless the pitch and tone are spot on!

So, if you are intent on becoming a serious computer user and, instead of playing games want to write your own software, buying a data recorder is a sound idea.

So how do you go about making the right choice and just what features should you look out for?

Well, for a start tape counters, although not essential, are a useful feature to have because they enable you to make notes about where on a tape a particular program is stored (should you have more than one per tape). It certainly beats guessing the position, which frequently turns out to be a hit and miss affair!



If the data recorder you've set your heart on doesn't have a tape counter, don't despair — look for a monitor function instead. This handy facility lets you listen to the tape as it's playing, fast forwarding or rewinding.

A monitor not only gives you a feeling of confidence, because you know the program *is* actually there, but it also allows you to hear the silences between programs — if you know what we mean?

It is also well worth looking out for a model that has both tone and volume control. The ability of any data recorder (or cassette recorder) to work properly with your computer depends on the quality of the signal that it's sending out.

You need to be able to adjust that signal as finely as possible in order to achieve a good load, volume adjustment alone isn't always sufficient, as we have discovered to our cost.

After that, providing you have got the usual fast forward, stop, eject and play buttons, there's not much else you need to be on the look out for in terms of features, although quality is also an important consideration.

To give you an idea of what's available and the sort of price you can expect to pay, we have pestered several manufacturers and managed to lay our hands on three data recorders and three 'ordinary' cassette recorders — although we'll concentrate on the data recorders here. They are listed in the table on page 81.

At the top end of the range is JVC's data recorder costing a mere £89! It's expensive but looks very sophisticated and is an excellent performer.

It is electronically controlled by touch-sensitive switches, and can be remotely activated by your MSX computer as well.

Features include a phase changeover switch, edit/talk and a talk microphone. The second item permits you to create no-signal blanks between programs you're going to save to facilitate program searches. And when it's used in conjunction with the microphone switch you can add comments (also known as voice-filing) just before each program.

Compared to the JVC, which can be described as the 'ultimate' in style, the Sanyo DR101 appears quite mundane and looks just like an ordinary cassette recorder.

It has a phase button on the right hand side which is useful when loading a cassette that has been saved on another machine. If any errors occur, or you can't find the program, flicking the switch will often solve the problem.

At £29.99 it's a lot cheaper than the JVC but loads prog-

rams and games just as quickly without any problems. Indeed, it loads tapes other recorders seem to have trouble with.

And what's more it can be mains or battery operated and comes with a carrying handle. But the style and colour scheme might be a little unimaginative — it depends whether you want good looks.

If you like the boxy, upright style of the JVC but don't fancy the price you could be pleasantly surprised with the Binatone.

At the same price as the Sanyo, it owes its styling to the JVC, although it can't match that model when it comes to quality and finish.

We put it through the same loading and saving tests as the other two models and it performed adequately, in spite of its less than sophisticated construction. But we noticed two distinct disadvantages which, although not serious, are worth noting.

Dirt & dust

If you've got chubby fingers, removing a cassette could prove difficult — the cassette flap is very narrow and was definitely designed with sylph-like digits in mind!

The other fault is again with the cassette flap. When you open it to insert a cassette all the internal components are exposed. This means that everytime you take a cassette out or put one in dirt and dust can get into the mechanism.

Eventually grime could build up to such an extent that it could lift the tape away from the magnetic heads so that the signals will be degraded and the tape itself may suffer some damage.

Apart from that it's reliable, sturdily built, performs more than adequately and at £29.95 it's a reasonable price too.

So, three very different items. If cost isn't a consideration then you'd be well advised to go for something like the JVC model. But if you're a little more concerned about budget, the Sanyo recorder is one of the most reliable and efficient machines we've come across.

The Binatone gives you fancy styling. But once that attraction has worn off you might find you'd have done better going for a more robust recorder. So the moral is — don't get taken in by looks. ■

FEATURES AND SPECIFICATIONS

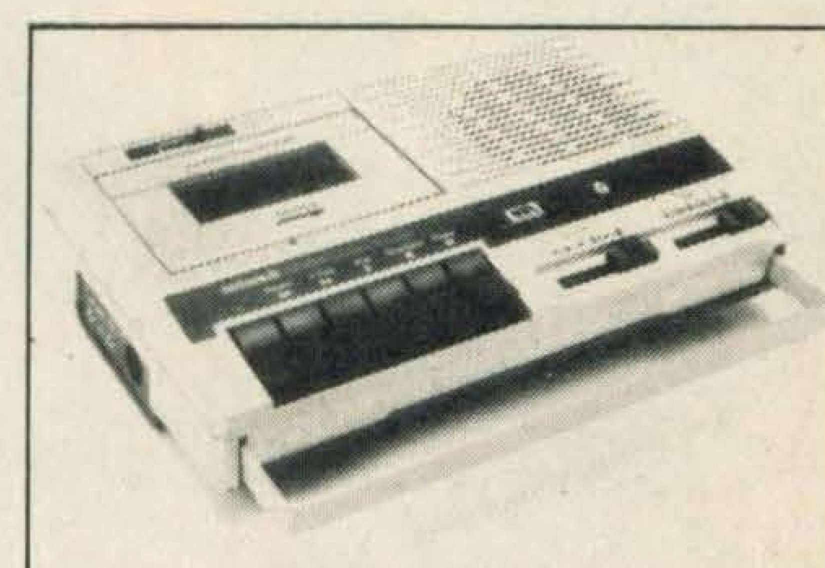
Model	Tape Counter	Automatic Level Control	Phase Switch	Monitor	Price	Supplier
Binatone 01/6565	Yes	Yes	Yes	Yes	£29.95	Binatone 01-903 5211
Omega Compucorder	Yes	Yes	No	No	£24.95	Microdealer (07073) 28181
JVC HC-R105	Yes	Yes	Yes	Yes	£89	JVC 01-450 3282
Network NW900	Yes	Yes	No	No	£29.95	Network Marketing 01-202 0911
Sanyo DR101	Yes	Yes	Yes	Yes	£29.95	Sanyo (0923) 46363
Toshiba HX-C810	Yes	Yes	No	Yes	£34.95	Toshiba (0276) 62222



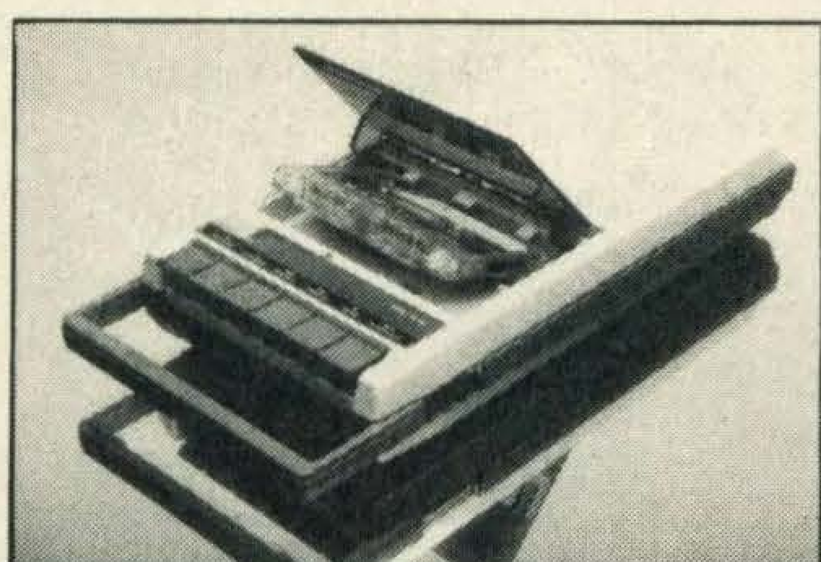
Toshiba HX-C810



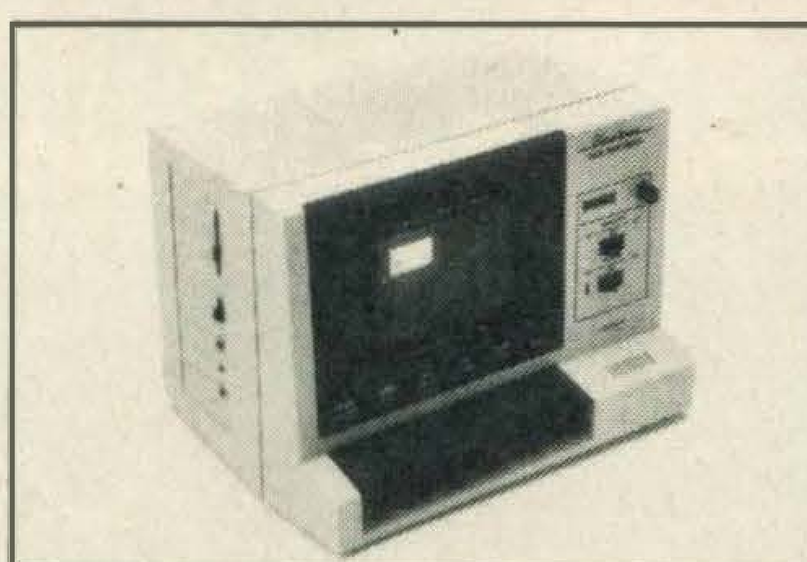
Omega Compucorder



Network NW900



Sanyo DR101



Binatone 01/6565



JVC HC-R105

TAPE RECORDERS

It's just possible that you don't need the extra features of a data recorder, and that an ordinary cassette recorder will fill your needs. To give you an idea we looked at three models from Omega, Network and Toshiba.

The recorders we looked at range in price from £24.95 for the Omega Compucorder to £34.95 for the Toshiba HX-C810. The Network costs the same as the Binatone but looks nowhere near as attractive.

All three were tested by saving and loading various programs and a selection of games and to be honest they worked just as well as the data recorders.

The Toshiba HX-C810, although called a cassette recorder, has (unlike the Omega and Network) a handy monitor switch — usually found on dedicated data recorders.

Toshiba has also spent a lot of time on the rather elegant design so that it matches up with the company's new HX-22 micro.

At £34.95 you might think that it's a little pricey. On the other hand the Omega Compucorder and the Network model don't have monitor switches.

The Omega, which is the cheapest model (ane looks it) saves and loads programs just as well as the others as far as we could see. It's just a pity the company didn't pay a little more attention to style and finish. A particularly painful example is the cassette flap which only closes when it's slammed down very hard. After doing that for a few times it's sure to get on your nerves . . . it did ours! The overall finish of the machine isn't up to that of the other two models.

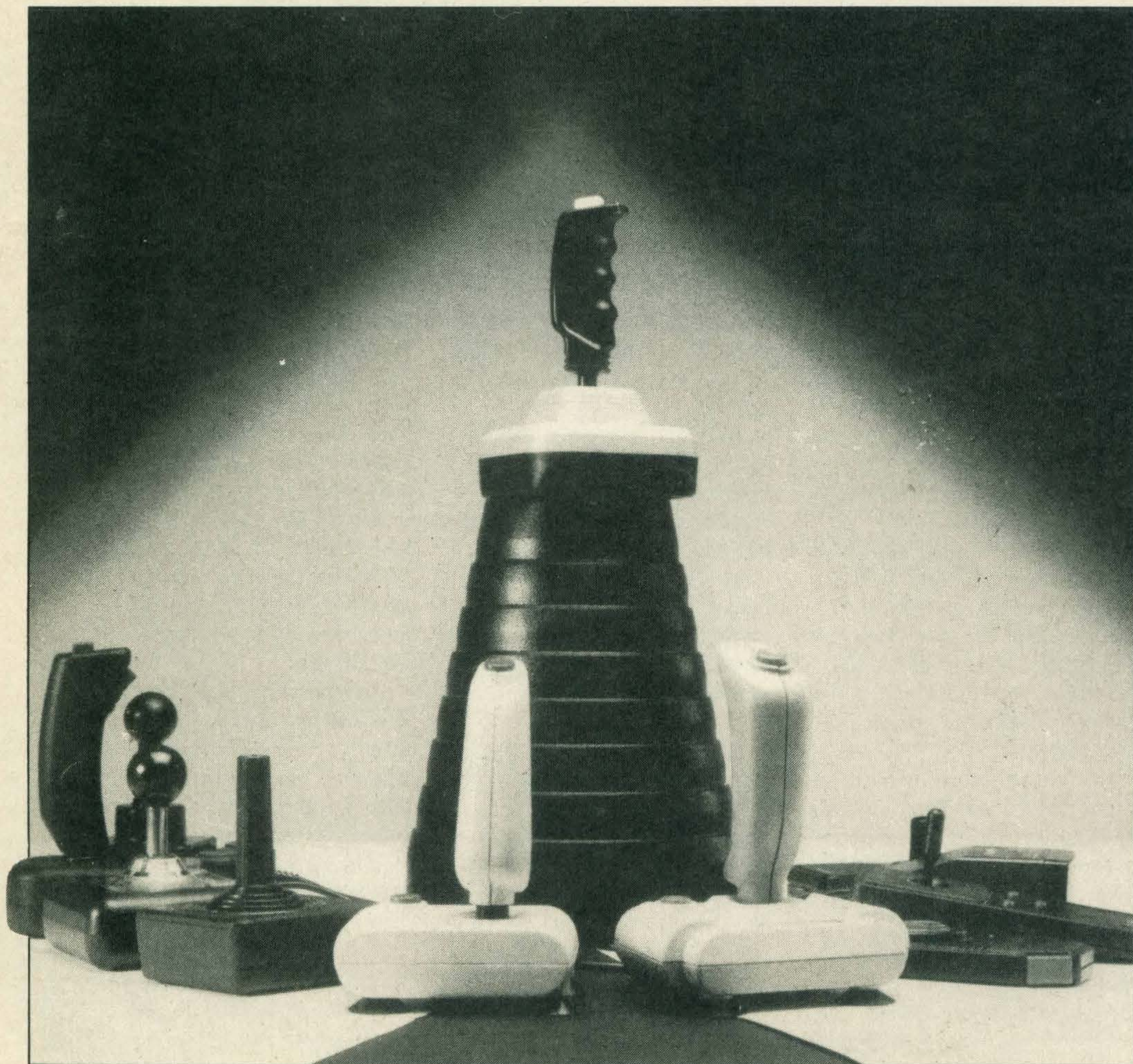
As for the Network we did experience a few loading problems, but we discovered that it's necessary to set the volume and tone controls to maximum.

Overall we were impressed with all three models as each lived up to the manufacturers claims. Ultimately the decision to buy a data or cassette recorder is yours.

But before you do, take a tip from us. Don't be tempted into forking out for a model just because it looks good when an ordinary, no-frills one will work just as well.

FIRE POWER

Get the most from your games with a joystick or two. Mike Gerrard tries out a few of his favourites and gives his verdict



If you thought it was hard enough choosing an MSX machine from the wide range available, just wait till you come to choosing a joystick. To say there are millions available is perhaps a slight exaggeration, but there are certainly several dozen around. Even if there were only two types you could still end up buying the wrong one and not being able to get the most out of those games.

The reason for the wide choice open to the MSX user is that not only are manufacturers such as Sony and Canon busy producing their own joysticks, but the type of joystick port chosen as standard under MSX is, wisely enough, the most popular. This is generally known as the Atari type, which is also compatible with the Commodore 64, so you can choose from any joysticks said to be suitable for those machines.

If you're not sure, just look at the connector on the end of the joystick's lead. The Atari/MSX type has nine holes, to connect with the nine pins in the joystick port, a row of five and a row of four. The other main type of joystick you're likely to see is the straightforward round five-pin DIN socket connection, so if you're buying in a shop or perhaps even second-hand then you're not likely to get the two confused.

Buying second-hand is perhaps not the best thing to do as regards joysticks, unless you can see it in action and the whole unit still feels sturdy, as by their nature joysticks take a lot of hammering. The connections inside can easily work loose, so you might wind up with a stick which will only let you move in one direction — that doesn't do much for those high score tables.

Some of you may even be wondering whether you need to buy a joystick at all. If you're at all keen on playing games then you should certainly do so if you can afford it. It's true that most games offer either keyboard or joystick control, but an increasing number don't offer the keyboard option, and you can certainly get finer control of movement with a joystick, particularly if you get confused with the cluster of cursor keys.

In games requiring eight-directional movement, trying

to cope with just a keyboard can result in a severe case of knitted fingers.

Fortunately most joysticks today are made to cope with eight directions, whereas a year or so ago many would only respond to the four compass points, and you would need to watch out for these restrictions.

Even so, those four additional directions of movement frequently cause problems. I used the Electric Software game *Shark Hunter* to see how different joysticks fared with the need to register eight different directions. Also used were two Konami titles, with *Tennis* mainly testing subtlety of movement and *Hyper Olympic 1* for robustness, although all the joysticks tested have been in constant use in the *What MSX?* office for some time.

What has to be said, though, is that response to joysticks differs from person to person, and while it's possible to give a reasonably objective criticism of a computer or printer, say, that's much more difficult with a joystick: some like small slim ones, others like them so large they look like they've come straight off a jumbo jet flight deck. This is also an area where you don't necessarily get what you pay for: cheap sticks can be better than the more expensive gizmos.

Reasonably priced at £8.95 is the Slik Stik, one of several produced by Suncom in America, as you might guess from the spelling. This is definitely not one for the macho types.

For such a dainty object, though, it was robustly built and gave excellent response to *HyperOlympic 1*, where the top of the stick could be cupped in the palm of the hand and rattled back and forth for the running events. It gave good eight-way reactions, far better than most, and the only drawback was the single tiny fire-button on the front left of the base.

In fact I preferred it to the next model up in the Suncom range, the Starfighter, at £10.95. Described as 'The Ultimate Joystick,' it looks more like a miniature traffic bollard, being a plain stick about 1.5 inches high.

The base and fire button are obviously from the same mould as the Slik Stik, though the button on this one wouldn't



Atari joysticks are MSX compatible

respond to two quick successive pushes, making it impossible to serve at *Tennis*. It didn't seem to have the same delicate responses as the Slik Stik, but it is sturdy and copes with *Hyper Olympic* well.

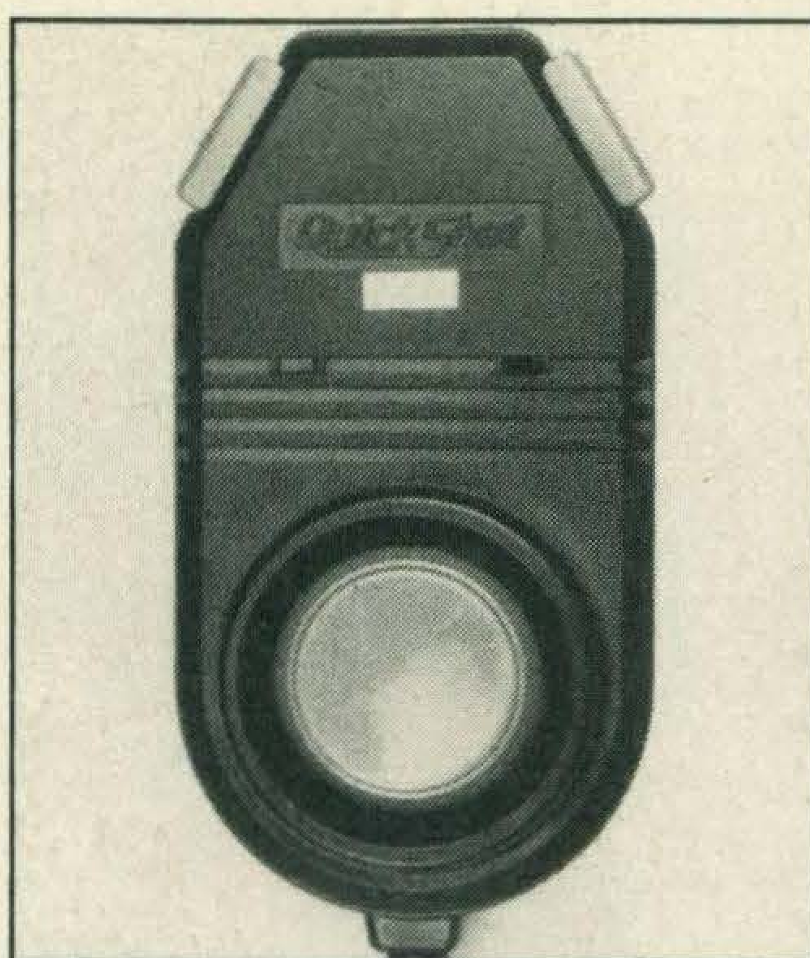
Tac-2 is £15.95 and a slightly larger version of the other Suncom sticks. It has the advantage of two large fire-buttons on either side of the base front, is solidly built and coped best with the rigours of *Hyper Olympic*, but eight-way movement was poor and it was rather sluggish generally in its responses.

My tennis reputation was saved, though, when I switched to a Wico joystick, The Boss. Taking over a game at 0-40 I proceeded to serve my first ace, win the game, and the following two as well.

The little player moved about the court like a manic Navratilova, and although the stick doesn't look very attractive in grey, black and white, and in fact it has a rather loose feel to it when you move it, so that you're worried you're going to wrench the stick off the base, the response it gave was fast and spot-on.

It was one of the best for eight-way control, and was less happy though no worse than many on *Hyper Olympic*. The main complaint was only having a single fire button on the top of the stick itself (a properly shaped handgrip) but that was a minor niggle.

Wico also manufactures Command Control, another high-quality joystick, this one offering either a square-style moulded handgrip or a circular grip, with a fire-button on top of the handle and a second on the front left on the base. There is also a switch which allows you to use both buttons as fire buttons, or to use the top button as a fire button and the



Something quite different — no stick!

base one as a reset button.

This odd addition can be useful or a nuisance, although the switch isn't easily moved across by accident, and the stick itself offers fast and accurate control.

The Gunshot joystick has two fire-buttons, one on the front left of the base and the second rather badly placed on the handle — it's rather too far back to get your thumb on it comfortably. This is also one of the most unattractive and cheap-looking joysticks around, with the beige and olive plastic moulding seeming to be on the verge of coming apart.

After regular use in the office, the joystick now won't respond to right-hand movement ,which is a great shame as otherwise response was quite good, though I wouldn't put money on it lasting a lifetime.

A personal favourite of mine is the Competition-Pro, which has seen service on a Spectrum, Commodore 64 and now an MSX machine. It has a large fire-button on either side of the front of the base, and its stubby appearance belies the delicate control it offers in most games. Unfortunately it doesn't cope with eight-directional games too well, and I wouldn't like to run too many *Hyper Olympic* races with it — this really does put a joystick, as well as the player, through its paces.

Not all joysticks are conventionally constructed, and Spectravideo has produced a Quickshot, which is an attempt to emulate the tracker-balls of the arcades. This is simply a mouse-type base, with fire-buttons either side of the 'nose' and a large flat-topped button set into the base to control the movement.

It's very hard to get used to



Blast aliens from a distance

the unusual finger-movement required, particularly in *Tennis* where you're doing some fine-manoeuvring, but if you're used to arcade-type controls then this could suit you.

There are also remote-control gadgets around, such as the Sony JS-75, though whether you want to fork out £64.95 just to blast aliens from a distance is up to you. The device itself is rather awkward to hold, and like some others it seems to be trying to ignore the fact that most joysticks are conventionally built because that's proved to be the best way of making them do the job they do.

If you want to sit back and knock spots off Invaders or even tennis players then the Silica Shop has imported several useful items, including a 12-foot coiled extension cable which plugs into the joystick port and then accepts your joystick in the other end.

There's also a Double-Play adaptor that plugs into both ports and allows one joystick to control them, giving the player the chance to take alternate turns on two-player games without swapping leads around, or you could simply play with yourself, as it were, on two-player options.

Finally, there's the Southpaw, which swaps all joystick controls around for left-handers, so if you want your spaceship to move up when you push down then this could be for you. Alternatively you could simply turn the joystick upside down if the fire-button was still accessible.

I'm not sure how useful this last device really is, though if you connect all three together you can take both turns killing aliens left-handed from a distance of 12 feet! How much more joy could a joystick possibly give you? ■

READ ALL ABOUT IT!

A flurry of book publishing activity accompanied the MSX launch. We look at the best available titles

If you've bought an MSX micro and can't make head or tail of the manufacturer's manuals, don't despair. The launch of a new computer always heralds the publishing of a wealth of titles each claiming to be the definitive guide — and MSX is no exception.

Even before the machines were officially announced Jonathan Pearce and Graham Bland jumped onto the impending bandwagon with *MSX An Introduction*. The acknowledgement to Spectravideo and the appendices highlighting the differences between its BASIC and MSX-BASIC explains how their title hit the bookstalls in record time, making it the first guide to MSX.

And it was soon followed by many others with similarly uninspiring titles.

There are now as many books as machines on the market and they tend to fall into three main categories; for the complete beginner, for those with previous home computer experience but new to MSX and for those who are experienced BASIC programmers and interested in machine code.

If you're a complete beginner steer clear of Bland and Pearce's contribution to MSX (even though it's pitched at the uninitiated). Not only is it full of typographical errors, inaccurate and nonsensical flow charts but it introduces such terms as strings and subroutines without offering explanations, a sure way to confuse and lose novices. And to cap it all there isn't even an index!

In complete contrast is Tony Marriot's *Starting With The MSX*. This is aimed specifically at the first time user and kicks off with an explanation of computer jargon before going on to describe the layout of the keyboard and the functions of the various keys.

Most beginners will find this an easy and informative read but whether it warrants a price tag of £5.95 is debatable as it's noticeably full of 'creative' white space.

Lower down the price scale is *An Introduction To MSX BASIC* costing a mere £2.50. Like Marriot's book it too is aimed at first time users who've probably exhausted the novelty of games playing and want to write programs of their own.

Readers with pre-MSX programming experience will also find it a good read as it covers MSX's music capabilities and shows how to create a three part harmony. It pays considerable attention to multicolour and sprite graphics whereas many introductory books only give them a fleeting mention.

However, if you're not a novice, but are hankering after something a little more meaty and own a Spectravideo, Brian Boyde-Shaw's book might appeal. *Getting more from MSX — With Spectravideo And All MSX Computers*, tells you who the text is primarily written for.

Beginners will find the first chapter a struggle as will non-Spectravideo owners . . . despite the title. Like Pearce and Bland, Boyde-Shaw wrote his book prior to the MSX launch. And I wouldn't mind betting that he originally wrote it around Spectravideo's SV 318 and SV 328 machines and then hastily revamped the book when those machines were dropped and the 'real' MSX machines were brought out.

A novel feature of the title is that each new concept introduced is presented as a problem to be solved. The program which solves the problem is then illustrated and explained.

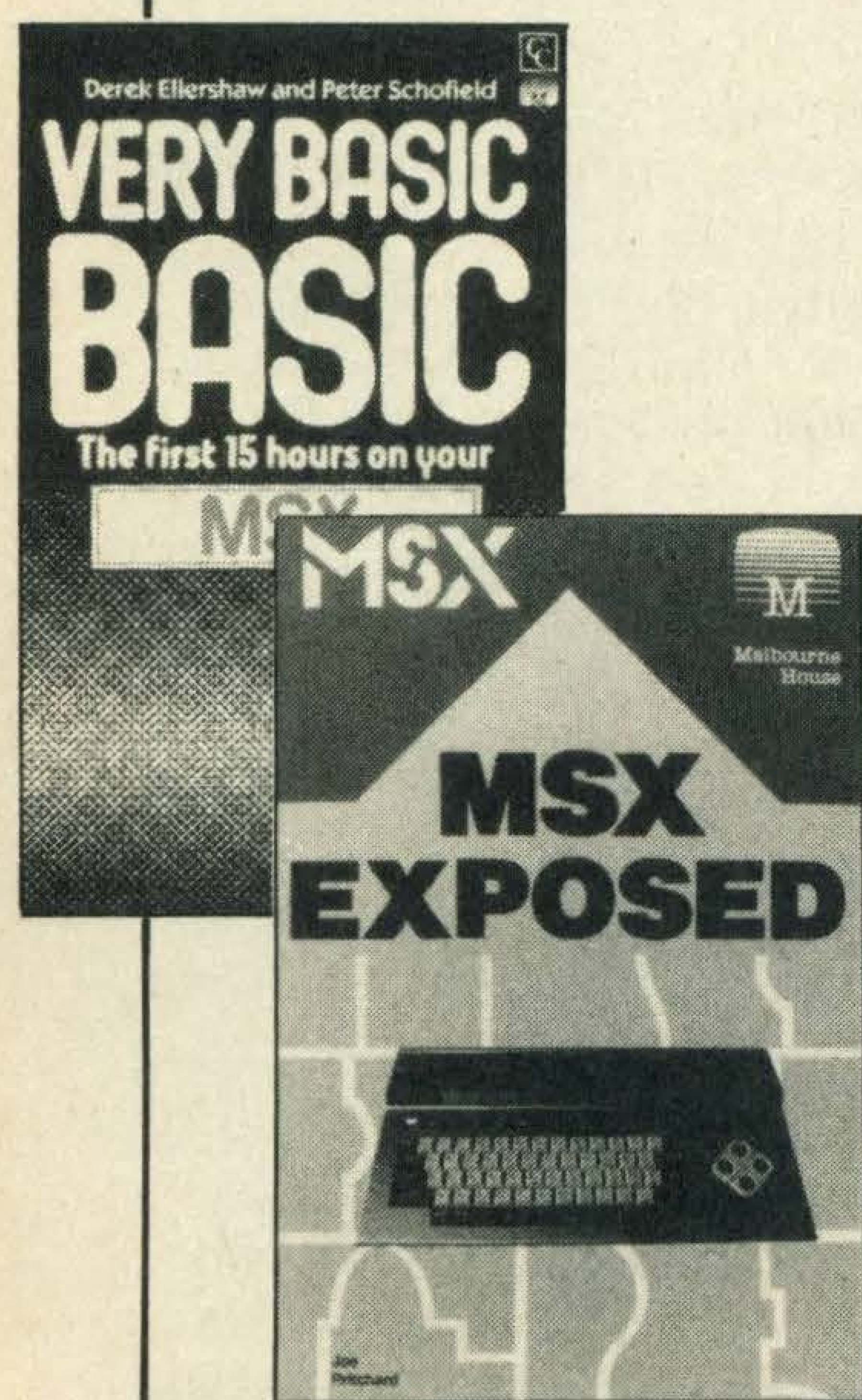
As a supplement to a manufacturer's manual (namely Spectravideo's) this book is a good buy; owners of other machines would do better looking elsewhere to spend their £7.95.

Like I said before there's a lot of books lying around with the familiar and much over-used title 'An introduction to . . .' and Kuczora and King's *Introducing MSX BASIC* is yet another.

Aimed at the new MSX owner who has previous computing experience, in other words a pre-MSXer, the authors fall into the usual trap of explaining the whole concept of MSX . . . if readers have MSX machines then they must surely know what the MSX standard is, or at least have an inkling?

The authors stress that there is no substitute for hands-on experience. With this in mind the book has been split into three sections. The third section contains five programming projects which have been chosen to 'represent as wide a cross section as possible of the range of uses to which a home computer can be put'.

It sounds good but what you're offered is three games, an educational game and a very familiar utility — an



An Introduction to MSX BASIC	Babani £2.50
MSX An Introduction	Century £7.95
Very BASIC BASIC	Century £2.95
Working with MSX BASIC	Collins £7.95
Teach Yourself Computer Programming in MSX BASIC	Hodder/Stoughton £3.50
Starting with the MSX	Kuma £5.95
MSX Exposed	Melbourne House £7.95
The Complete MSX Programmers Guide	Melbourne House £14.95
Introducing MSX BASIC	Micro Books £6.95
MSX BASIC Revealed	Penguin £6.95
A Programmer's Guide to the MSX System	Sigma £7.95
Getting more from MSX with Spectravideo and all MSX computers	Sigma £7.95
Introducing MSX assembly language and machine code	Collins £8.95
Starting machine code on the MSX	Kuma £7.95
Practical MSX machine code	Virgin £4.95



address book. MSX's music abilities have been totally ignored.

But, to give it credit, the projects are well thought out. Starting from scratch you are shown step-by-step how to build up a program.

Joe Pritchard has broken away from the 'An Introduction to . . .' mould and has a more meaningful title for his book, *MSX Exposed* and expose it he does!

Writing in much the same vein as Tony Marriot he knows exactly who his readers are — newcomers — and adopts a tutorial approach beginning with BASIC programming through to machine code.

Pritchard is meticulously thorough. Every program statement is carefully explained and backed up with demonstration programs, tables of vital memory locations and system variables. If you're looking for a broad perspective on MSX's capabilities then this is the book to go for.

However, if it sounds too advanced because you've not got much further than switching your micro on, *Very BASIC BASIC* could well solve the problem.

This is a title that should be standard issue with every MSX computer. It caters for the non-technical novice and starts off with a reassuring 'Don't Panic!' and then familiarises the reader with the part of the computer that is used first — the keyboard.

Once that's out of the way basic programming techniques are introduced. All the examples are presented in the form of a quiz, game or self-questionnaire which adds to the book's appeal and just goes to show that learning how to program can and should be fun.

All this for £2.95. The author avoids high falutin technical jargon — it really can be classified as an 'introductory' text.

Slightly higher up the price scale at £3.50 is a very down to earth text with a slant towards the more 'professional' computer user. Arithmetic and scientic functions are heavily emphasised throughout.

Both authors have taught in colleges of higher education — the give-away is that the chapters are liberally scattered with 'problems' for the reader to solve.

This is by no stretch of the imagination a 'light' read, but it gets the message across loud and clear and at £3.50 will hardly break the bank.

So many titles claim to cater for the novice and the experienced programmer, including *MSX BASIC Revealed* by Palmer and Richards. Having read the text from cover to cover it's the novice who'll get most benefit from the first nine chapters, as the experienced bods will already understand strings and variables.

And I'm not convinced that they will want to part with £6.95 just to glean a few tasty morsels out of the last few chapters on colour, graphics and sprites.

It's written very much in the same vein as Ian Sinclair's *Working With MSX BASIC*. He has the edge over Palmer and Richards as he goes a step further and gives more space to graphics and sound.

Both titles are worth delving into but for more experienced programmers I'd recommend a more advanced title such as *A Programmer's Guide to the MSX System*.

This is compelling reading but only for the competent programmer and those interested in machine code. It is a very meaty title and might be heavy going.

This is a difficult book to get into but if you're interested in writing high performance programs and improving your machine coding this is the book to buy.

At £14.95 *The Complete MSX Programmers Guide* is currently the most expensive title on the bookstalls. But when you see how many pages it has (568) and run your eyes down the contents page you'll see that it's not just another text book but a programmer's bible designed to be continually referred to.

It contains just about everything and could quite easily have been called *Everything You Wanted To Know About MSX But Were Afraid To Ask*. It is an invaluable guide for all MSX users from novice to the most advanced.

There aren't that many titles available yet for the third category, those interested in machine code, but the three I've come across offer a sound introduction to the subject.

Most people turn to machine code because it offers better facilities for creating stunning graphics and sound effects, higher speeds and more efficient use of memory than is possible using BASIC alone.

Steve Webb's *Practical MSX Machine Code Programming* is a good place to start if you're new or vaguely familiar with code. Webb restricts the scope of his coverage very tightly in order to cover a few areas in terms that any BASIC programmer can understand.

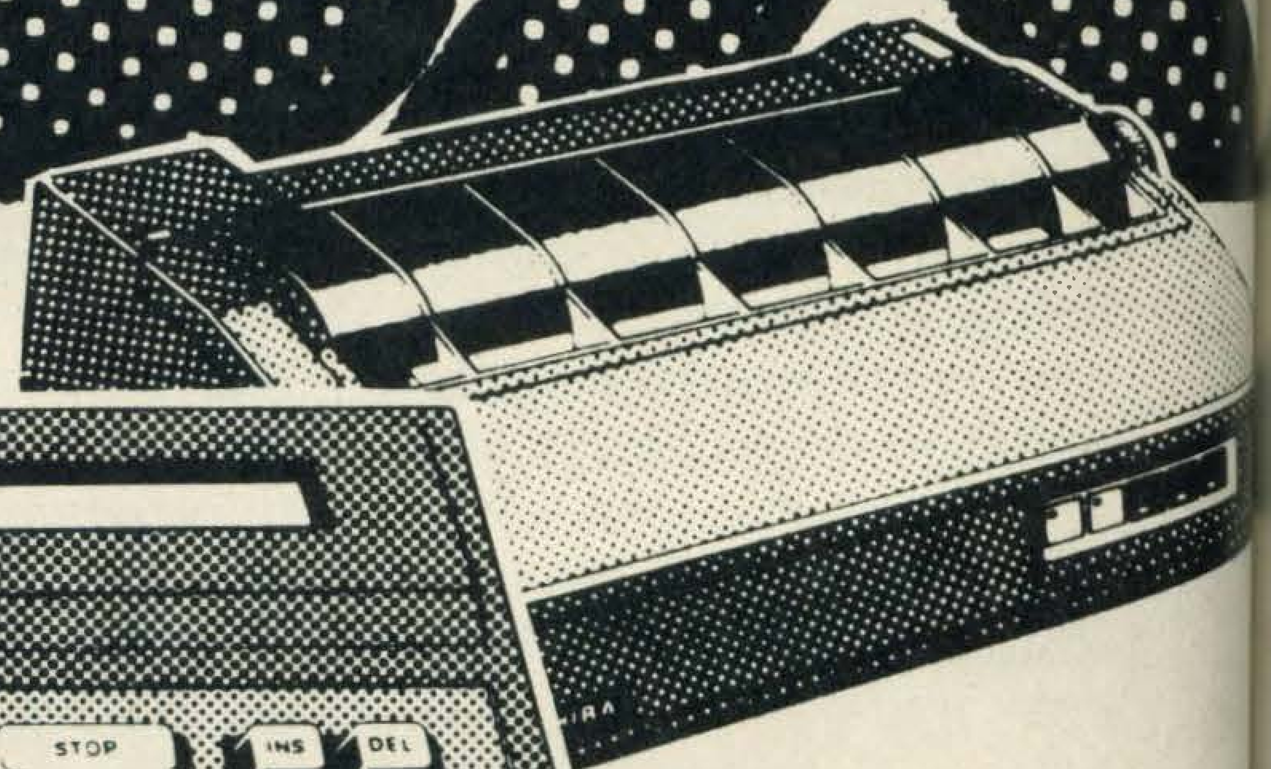
Having said that, the book doesn't teach machine code as such but assembly language and it doesn't really do that either. What it does is to offer an overview of both, so it might be an idea to supplement it with *Introducing MSX Assembly Language and Machine Code* which really does do the business.

In complete contrast is Ridley's contribution, *Starting Machine Code On The MSX*.

All I can say is that Ridley obviously knows his stuff but has problems putting it down in print. He seems to be improvising the book as he goes along, a sure way to baffle novices and frustrate those more experienced.

Whether you're a novice to home computing, a pre-MSXer or interested in machine code there are plenty of books to choose from to suit all pockets. And by the time you read this there'll be a few more titles on the bookstalls. ■

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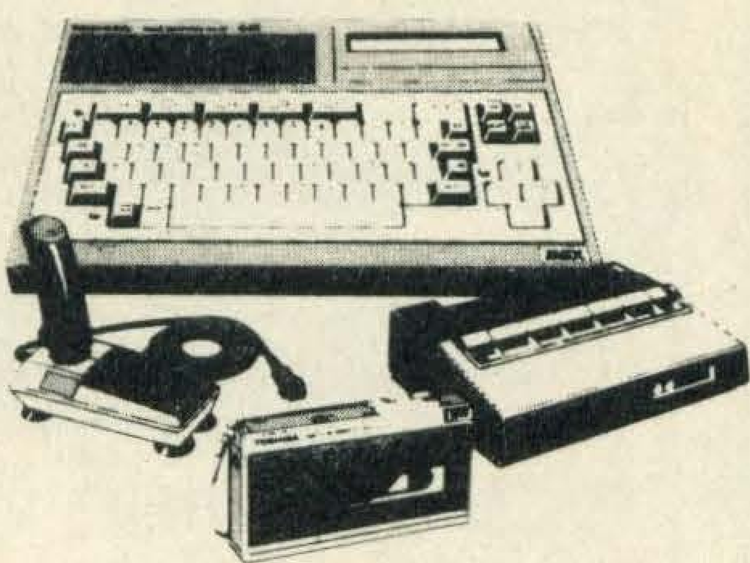
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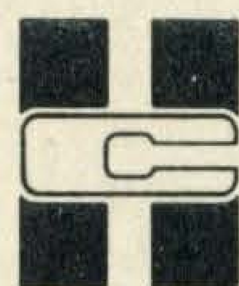
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Aberdeen AB2 4YW
(0224) 630526

Konami Ltd
269 Field End Road
Eastcote
Middlesex HA4 9LS
01-429 2446

Kuma Computers Ltd
Unit 12
Horseshoe Park
Horseshoe Road
Pangbourne
Berks RG8 7JW
(07357) 4335

Level 9 Computing
229 Hughenden Road
High Wycombe
Buckinghamshire
HP13 5PG
(0494) 26871

Llamasoft Ltd
49 Mount Pleasant
Tadley
Hants RG26 6BN
(07356) 4478

Longman Software
Longman House
Burnt Mill
Harlow
Essex CM20 2JE
(0279) 26721

Mastertronic Ltd
Park Lorne
111 Park Road
London NW8 TJL
01-935 4944

M.C.Lothlorien
56A Park Lane
Poynton
Cheshire SK12 1AE
(0625) 876642

Megacycal Software Ltd
PO Box 6
Birkenhead
Merseyside
L43 6XH
051-652 3139

Micro Aid
25 Fore Street
Praze, Camborne
Cornwall
TR14 0JX
(0209) 831274

Microcom
67 Gestridge Road
Kingsteignton
Devon
TQ12 3HJ
(0626) 60473

Microsoft
Piper House
Hatch Lane
Windsor
Berks
(07535) 59951

Mirrorsoft
Mirror Group Newpapers
Holborn Circus
London EC1 1DQ
01-822 3971

Morwood
Maple Walk
Bexhill
East Sussex TN39
(04243) 5840

Mr Micro Ltd
69 Partington Lane
Swinton
Manchester
M27 3AL
061-728 2282

Music Sales
78-79 Newman St
London W1T 3LA
01-636 7777

Ocean Software
Ocean House
6 Central Street
Manchester M25 5NS
061-832 6633

Office Junior
Market Place
Oundle
Nr Peterborough
PE8 4BA
(0832) 72127

Orpheus Software
The Smithy
Unit 1
Church Farm
Hatley St George
Nr Sandy
Beds SG19 3HP
(0767) 51481

Panasonic (UK) Ltd
300-318 Bath Road
Slough
Berks SL1 6JB
(75) 34522

PSS
452 Stoney Stanton Road
Coventry CV6 5DG
(0203) 667556

Quicksilva Ltd
Palmerston Park House
13 Palmerston Road
Southampton S01 1LL
(0703) 20169

Silversoft
London House
271 King Street
London W6
01-748 4125

Software Projects
Bearbrand Complex
Allerton Road
Woolton
Liverpool L25 7FS
(051) 428 9393

Sony (UK) Ltd
Sony House
South Street
Staines
Middlesex TW18 4PF
(81) 61688

Spectravideo Ltd
165 Garth Road
Morden
Surrey SM4 4LM
01-330 0101

Tasman Software Ltd
Springfield House
Hyde Terrace
Leeds LS2 9LN
(0532) 438301

Terminal Software
Derby House
Derby Street
Bury BL9 ONW
061-761 4321

Toshiba (UK) Ltd
Toshiba House
Frimley Road
Frimley, Camberley
Surrey GU16 5JJ
(0276) 62222

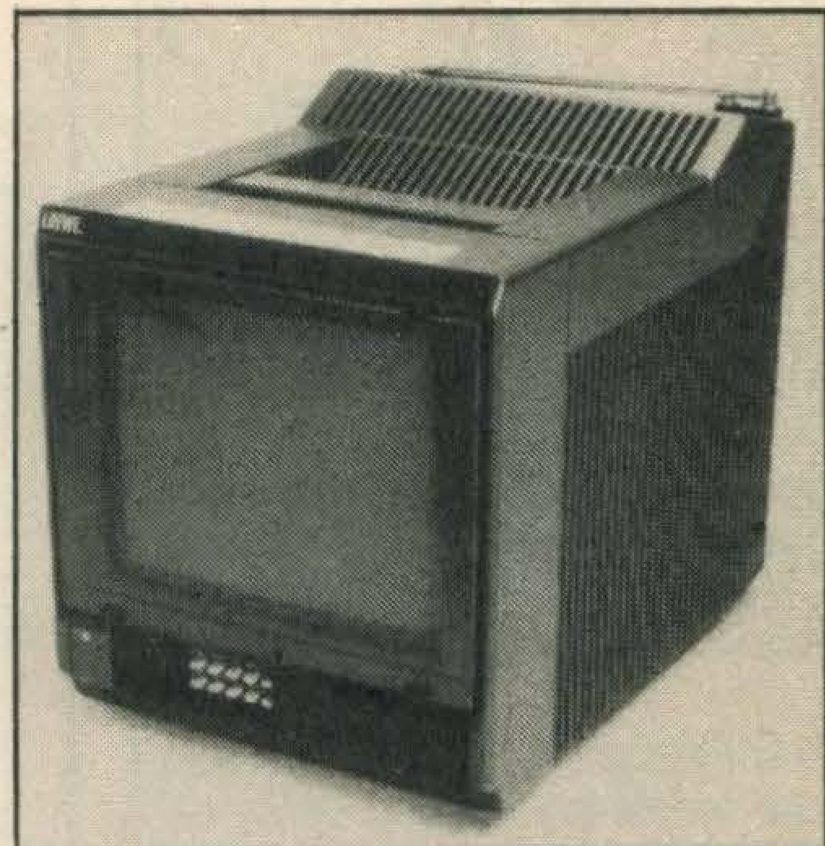
Virgin Games
2-4 Vernon Yard
Portobello Road
London W11 2DX
01-727 8070

Visions
1 Felgate Mews
Studland Street
London W6 9JT
01-748 7478

What MSX?



Over the next 15 pages you'll find all the information you need to build up a complete MSX system



Confused by computers? Puzzled by peripherals? Stonkered by software? Here are the answers — or at least the information that will get you on the right track. This is as comprehensive a guide as has been humanly possible to compile of the MSX computer scene. It details machines, peripherals and programs that are, or are due to be, available.

It is divided into six sections, over the next 16 pages.

We kick off with a diagrammatic overview of an MSX computer system — what plugs into what, what different things to do and so forth. Be warned, there's no such thing as a complete system. You'll be bankrupt before you get anywhere near buying all the things that you can use with your MSX computer.

The first main listing is a comparative chart of all currently available MSX computers. Many are reviewed in this issue of What MSX? The comparative table shows how they stack up against each other for price, features and so forth. You should be able to compile a shortlist if you haven't already settled on a favourite machine.

If you're a games player, you must consult the buyers' guide to joysticks. Here you'll find details of all kinds of joysticks, including paddles, remote control units, trackballs, and so forth. The aliens will never stand a chance!

To improve the quality of your image, consult the buyers' guide to monitors. We've the facts on just about every monitor costing less than £500. If you think that your games look good on the domestic television, wait till you see what a monitor does to them. We've got a full explanation of all the terms you'll meet in the monitor world too.



For hard print, the buyers' guide to printers has all the hard facts. Over 100 printers are listed, costing up to £1,000 or so. Some are super fast, others offer super quality. Some do colour, some run silently. Some can be used as an electronic typewriter, others as viewdata terminals. There's a tremendous variety of printers to choose from, and this guide should put you on the right path.

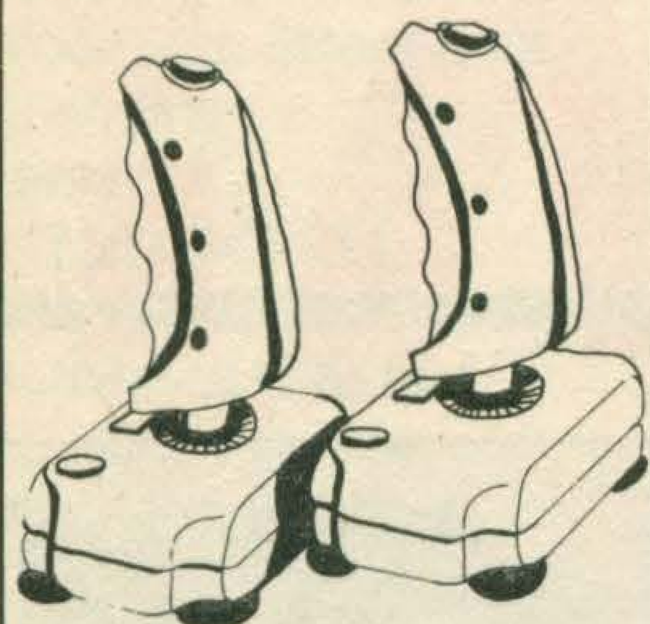
The last section of the Buyers' Guide lists MSX software. Some of it may not be available immediately, but is promised for the near future.

As there are so many software packages available, we've grouped them into categories. These are games, education, business, utility and other. We've listed the supplier of each package, and you'll find addresses and 'phone numbers of suppliers. Some of the software may not be available through your local MSX dealer, so you may have to order direct.

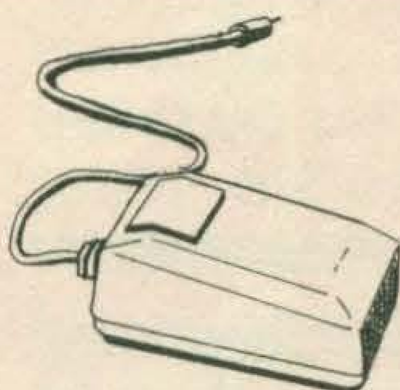
Prices throughout are approximate only. Peripherals may be discounted, particularly if they are popular and widely available. Computer prices can vary from shop to shop too. Check out advertised prices.

With the huge amount of MSX hard and software arriving on the market, we're sure you'll find just what you are looking for to make your MSX system do what you want it to.

TALKING COMPUTERS



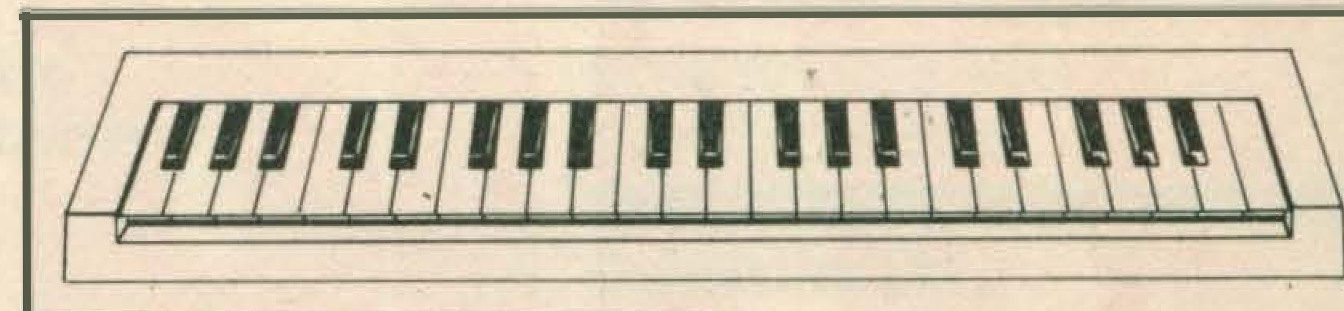
JOYSTICK
The most popular games controller, the joystick has one of two fire buttons and relays the player's movements to the computer. Some joysticks are available with continuous fire buttons for the cheats among us!

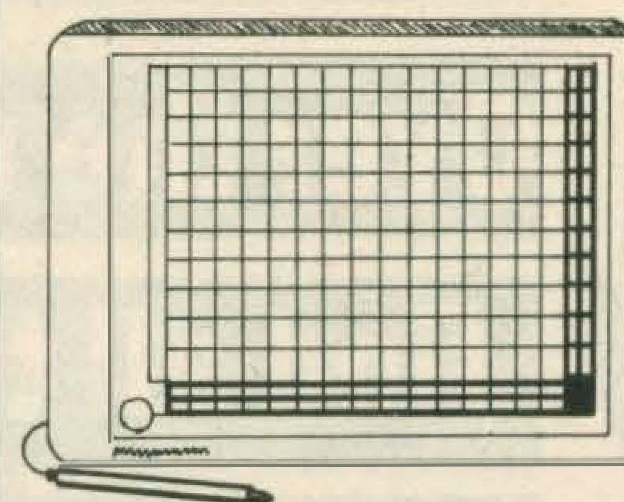


MOUSE
An alternative way to control the screen cursor. Works rather like a 'rolling joystick', the mouse's movements over your desk top are mimicked by the cursor on the screen. Good for building graphics.



LIGHTPEN
The light sensitive element at the end of a light pen sends signals to the computer via a modulator which interfaces through the cartridge port. Light pens can be used for educational games, graphics or any program which involves selecting from lists (menu driven).

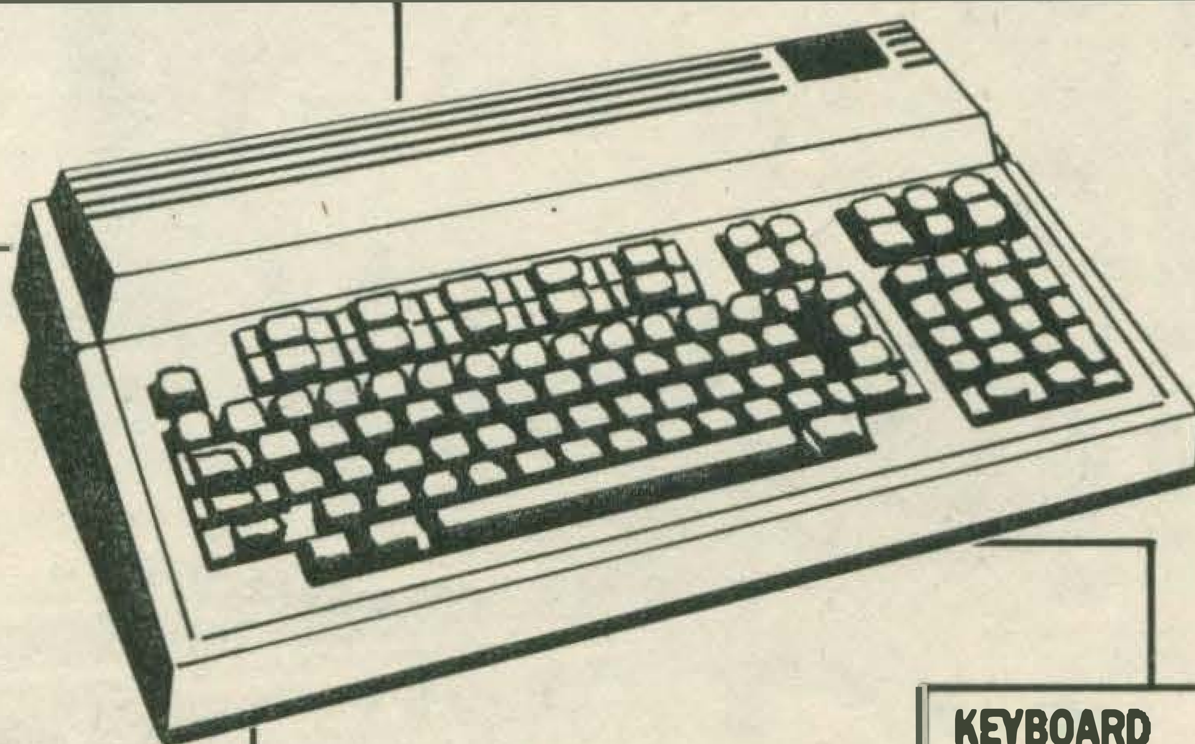




GRAPHICS TABLET
The computer equivalent of the Etch-A-Sketch! The stylus is used to draw lines on the tablet proper while the palette is used to choose colours and hatch patterns for outline filling.

MUSIC KEYBOARD
To enable computers to have quick access to music without the problems of coding or notation some manufacturers are producing 2½ or 4 octave keyboards which will plug in to interface cards for the MSX expansion bus.

INTERFACES
The 50pin input/output socket (**expansion bus**) on the MSX computer offers expansion possibilities through the use of dedicated plug-in modules. Called 'cards' these circuits can either expand the operation of the micro (an 80 column card for word processing or a data cartridge) or enable the computer to be interfaced with specialised input devices, light pens, music keyboards etc.



LANGUAGES
Computer languages are coded instructions. There is a wide variety of languages available each with its own application. MSX BASIC spoken here!

High level languages are computer languages easily understood by you and I but not by the processor.

Low-level languages (like Machine Code) are much closer to the language of the processor but are difficult to read by humans and hard to edit. The benefit of programming in a low level language is the higher speed at which it runs.

BASIC. This stands for Beginners' All-purpose Symbolic Instruction Code. Though developed as an introductory language it has now become one of the most widely used languages for home computing. Various dialects exist.

MSX BASIC. This is the extended version of BASIC written by the MicroSoft Corporation as used on all MSX computers.

ASSEMBLERS etc
Assembler. Correctly called assembly language, this exists between the high level programming language and Machine Code which it generates. Assembler carries over some of the benefits of a high level language (labels etc) yet is fast to run.

Compiler. This is a program which translates your program into Machine Code—permanently. Compiled programs are quick to run but very hard to edit.

Interpreter. Unlike the compiler, an interpreter translates your program into Machine Code one line at a time. This makes programs slower to run but relatively easy to edit.

CPU
The **Central Processor Unit** is simply a vast array of electronic switches which can either be on or off. These two states are represented by binary (base two) notation; there are two binary digits (**bits**), namely 0 and 1.

Machine Code. This is the language of the processor. This is called a low-level language because it is removed from the quasi-English of a high-level language like BASIC.

KEYBOARD
The Keyboard is the traditional interface between humans and the computer. The standard QWERTY layout is supplemented by some special keys on the MSX keyboard. The **function keys** marked F1-F10 allow complex commands to be entered at one key stroke.
Four **cursor keys** are used to move the cursor up, down and across the screen. Some games programs can be played with just the cursor keys and require no joystick control.

A **GRAPH** (Graphics) key allows the QWERTY keyboard to enter symbols with one key stroke. The GRAPH key works like the SHIFT key.

The full 73 key set is made up with four keys which allow insertion and deletion, one which returns the cursor to the top left of the cleared screen and one, SELECT, which is of use in WP and data entry programs but has no use in BASIC.

MEMORY
RAM (Random Access Memory) the amount of memory quoted in K (Kilobyte).

ROM (Read Only Memory) this is the memory 'set up' by the manufacturer. MSX Basic language is stored here. Like RAM this is quoted in K.

Byte. Memory is determined by the number of characters which can be stored. A character is coded by an 8 bit binary word which is called a byte.

Kilobyte. As computer mathematics are binary (to the base of 2) the nearest binary number to 1000 is 1024. 1024 Bytes make one Kilobyte. Megabyte and Gigabyte are terms for even larger numbers of bytes.

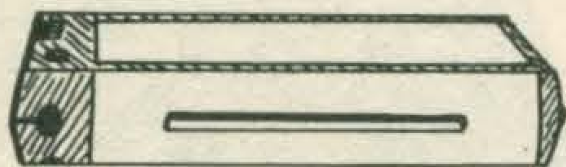
User RAM. Computers tend to use a lot of RAM when asked to generate high resolution graphics, to run other languages or specialised peripherals. User RAM is what's left over for your programming.

GENERAL
Software is the general term for computer programs. **Hardware** is everything else, the processor, keyboard etc. **Firmware** is software stored in a 'hard' form, cartridges and ROM chips are good examples.

Peripherals. The bolt-on goodies. This term covers, printers, plotters, joysticks, monitors and the like.

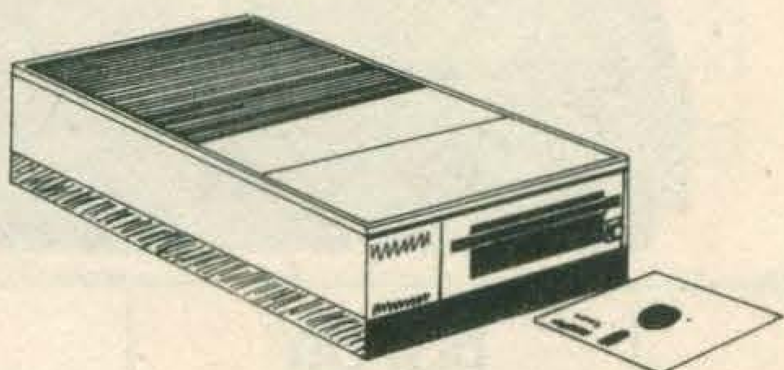
VDUs. A general term for a visual output; stands for Visual Display Unit and covers monitors, and TVs.

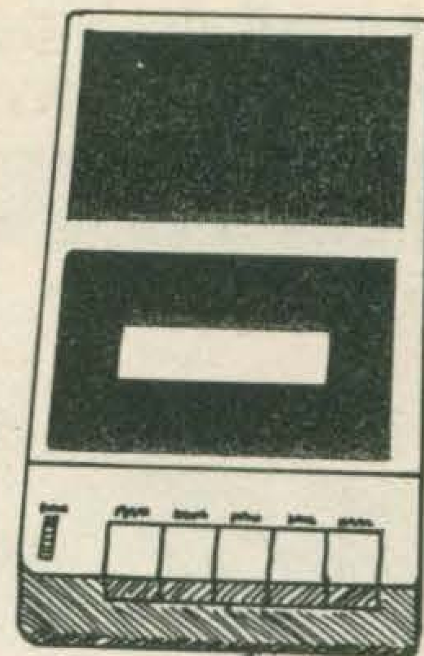
CARTRIDGE
The quickest way to load a program, but as yet the most expensive. Programs are permanently stored on a micro chip in the cartridge case which interfaces through a 50 pin cartridge socket.



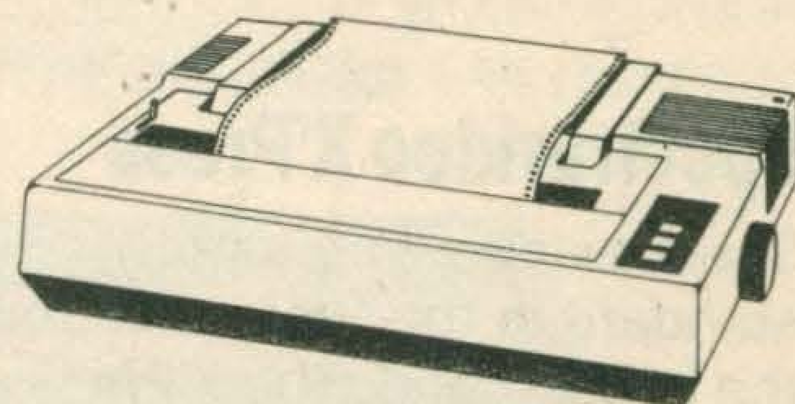
DATA STORAGE AND RETRIEVAL
Disks and **Compact Cassettes** are the most common forms of permanent data storage. Both are magnetic record/erase devices. Disks offer faster access to a greater amount of stored information. Cassettes are slow but cheap.

Disks are divided up into tracks and sectors. The computer needs to know where data has been stored; this 'housekeeping' function is run by a program called the Disk Operating System (**DOS**). The **MSX-DOS** (Micro-Soft Extended Disk Operating System) is used by MSX machines. **CP/M DOS** (Control Program for Micros) is data compatible.









PRINTERS AND PLOTTERS
Dot matrix printers build up the patterns of letters and characters by a bank of pins striking through an inked ribbon. Print quality varies from terrible to good.

Daisywheel printers are named after the spinning disc which carries the type elements on its spokes. The very highest print quality can be achieved but speed and character set is often limited.

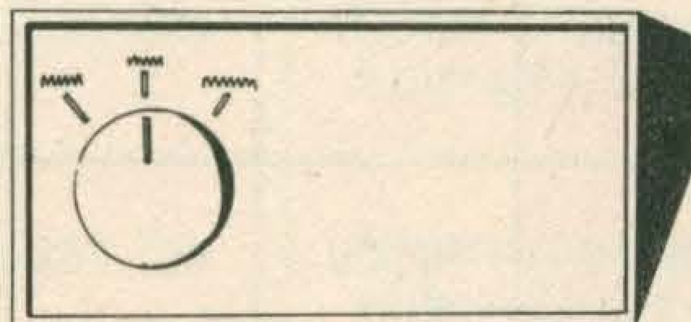
Plotters. These draw graphs and diagrams with a pen and can be either of the flat bed or platen type. A choice of pen colour is often offered.

Thermal printers. These offer fast, quiet but limited quality print often on especially treated paper which reacts with heat to show visible lettering. Material costs and print quality are often a deciding factor against such printers.

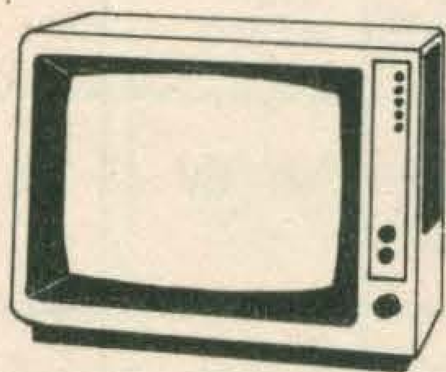
DATA TRANSMISSION
Computers can be networked to enable one user to talk to others individually or together through 'electronic mailboxes'. The telephone system can be used via special adapters to let one computer talk to others.

Modem stands for Modulator/Demodulator, a Modem turns the telephone system into a giant cable between distant computers. The Modem is a 'black box' which converts the low voltage digital signals from the computer into an analogue signal which can be transmitted over the 'phone system.

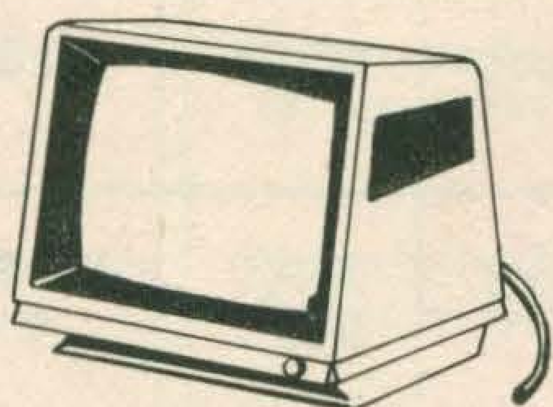
An **Acoustic Coupler** is a more portable and often cheaper way of interfacing a computer with the 'phone network'. Here the computer output is used through a modulator or to drive a telephone handset through a microphone and loudspeaker. Portable couplers offer the businessman instant access to his data base back at the office.





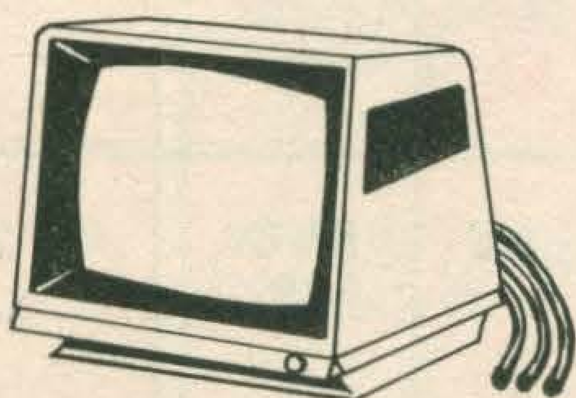


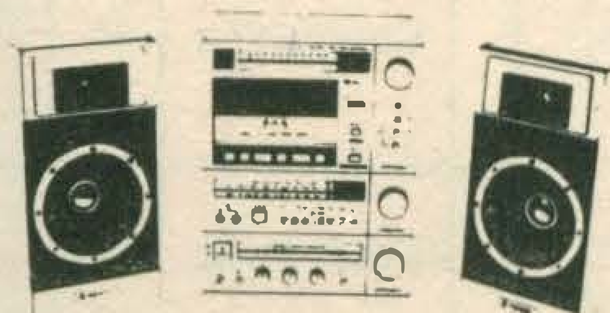
AUDIO AND VIDEO



GETTING A PICTURE
All MSX computers will give sound and pictures from a standard **TV** set through their UHF output. A dedicated **monitor** will give better resolution from the video output while the audio output can be taken to a hi-fi system if the monitor has no built in loudspeaker. **RGB** outputs allow individual control over the Red, Green and Blue electron guns in the monitor colour and can be used to produce high quality graphic images.

TEXT
Computers are frequently used for **word processing**, to write letters or reports. Most text displays give 37 characters (or 40) by 24 lines. Real word processor packages reform the text screen to 80 characters (some to 64 characters wide). Powerful editing facilities enable the user to delete and insert words, phrases or paragraphs, to search for and correct spelling. Dictionary programs can also be bought.





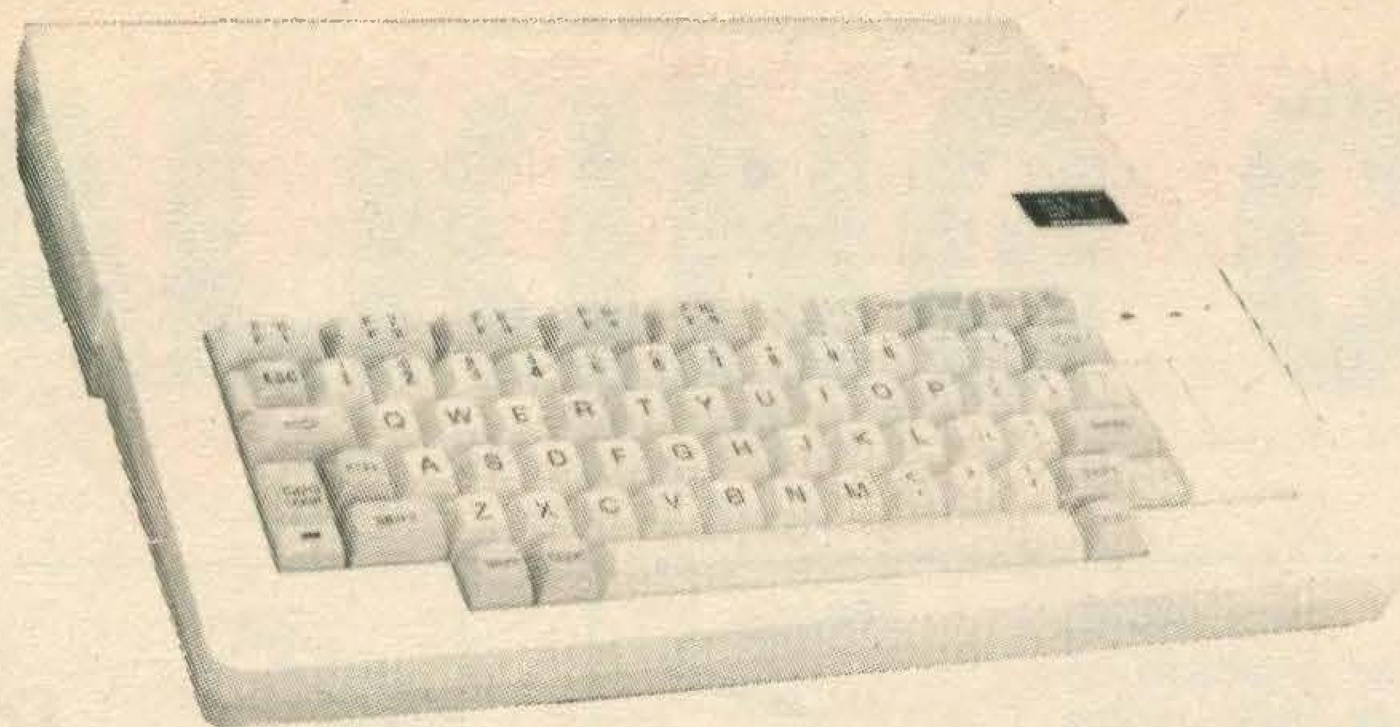
SOUND
Computers have conventional audio outputs which can be used to drive the tape or tuner input of any hi-fi system. MSX computers have three separate channels of sound, and a fourth channel of noise. Stereo outputs are possible. A computer can be used to define the precise waveform of a sound just in the manner of a synthesiser.

GRAPHICS
The smallest unit of 'graphic information' is the **pixel**. This can be thought of as the dot from which graphics can be built up. The MSX system uses a screen of 49152 pixels arranged in 256 columns of 192 lines.

Sprites are independently programmable groupings of pixels which form a recognisable character which can be 'addressed' around the screen.

16 colours are available to the programmer working in MSX.

BUYERS GUIDE



Spectravideo X'Press £400

Spectravideo was largely responsible for developing the MSX standard in the first place, but until now has kept very much in the background. The X'Press, when it is eventually launched by Spectravideo, will be the first MSX business oriented machine. Its features include a built-in 3.5 inch disk drive, RS232C inteface and an 80 column card.

With these facilities both MSX-DOS and CP/M operating systems can be used.

It's a formidable computer and if it does sell for £400, the X'Press will be hard to beat.

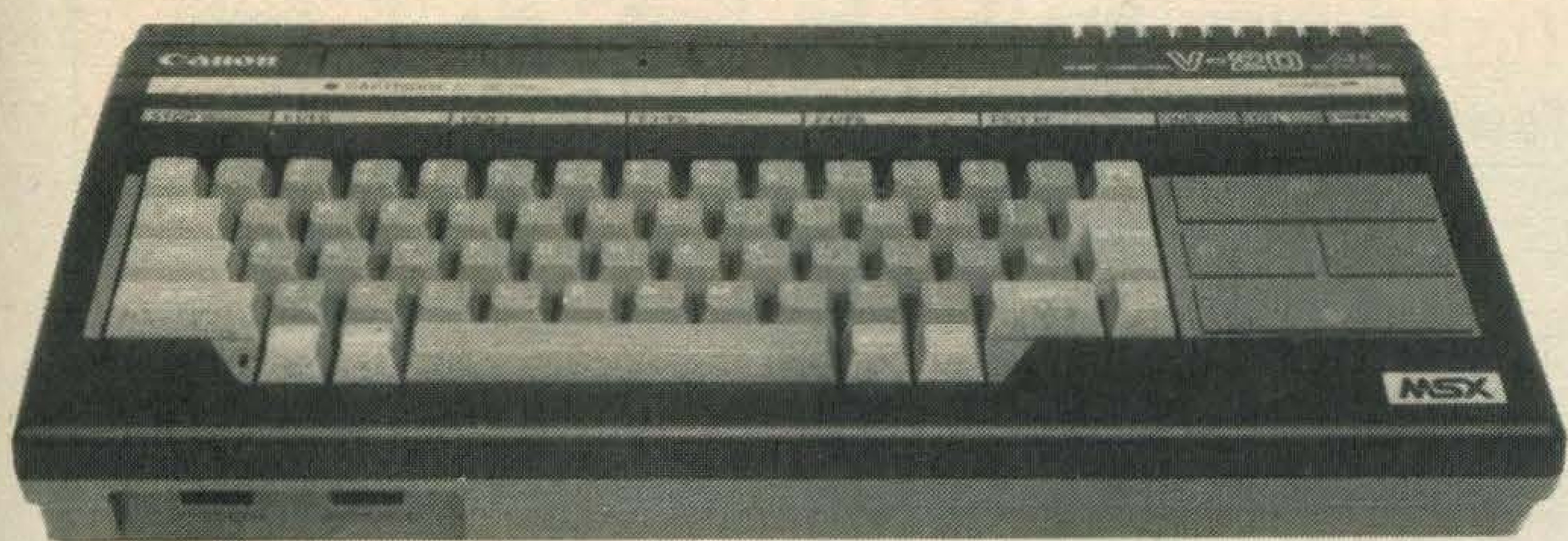
Toshiba HX-10 £239

Toshiba was the first Japanese maker to bring out an MSX computer and have been the most active in promoting the standard. The HX-10 is a mid-priced unit, currently supplied with a package of software and widely available through major multiples. It is a 64K machine with the usual range of interfaces, though there is only one true cartridge port.

Toshiba's peripherals include a joystick, an RS232-C adaptor, a dot matrix printer, a printer plotter and the usual array of data recorders and monitors. They are also importing a range of software on cassette.



COMPUTER			MEMORY			KEYBOARD			DISPLAY		INTERFACES						
Maker	Model	Price	Total RAM	RAM	ROM Contents	Type	Numeric Keypad	Cursor	Output	Text format	Joysticks	Expansion bus	Cartridge port	Printer	Serial port	Cassette	Output
Canon	V-20	£280	80K	64K	32K Microsoft MSX BASIC	73 key, full stroke	No	Keypad	RF, CV	40×24	2	—	2	Centronics	—	DIN	Mono
Goldstar	FC-200	£139	80K	64K	32K Microsoft MSX BASIC	73 key, full stroke	No	Keypad	RF, CV	40×24	2	Yes	1	Centronics	—	DIN	Mono
JVC	HC-7	£279	80K	64K	32K Microsoft MSX BASIC	72 key, full stroke	No	Keypad	RF, CV, RGB	40×24	2	—	2	Centronics	—	DIN	Mono
Mitsubishi	ML-F48	£219	48K	32K	32K Microsoft MSX BASIC	73 key, full stroke	No	Keypad	RF, CV	40×24	2	Yes	1	Centronics	—	DIN	Mono
Mitsubishi	ML-F80	£275	80K	64K	32K Microsoft MSX BASIC	73 key, full stroke	No	Keypad	RF, CV	40×24	2	Yes	1	Centronics	—	DIN	Mono
Panasonic	CF2700	£280	80K	64K	32K Microsoft MSX BASIC	73 key, full stroke	No	Keypad	RF, CV	40×24	2	—	2	Centronics	—	DIN	Mono
Pioneer	PX-7	£300	48K	32K	32K Microsoft MSX BASIC 8K P-BASIC	76 key, full stroke	No	Keypad	RF, CV RGB	40×24	2	—	2	Centronics	—	DIN	Mono
Sanyo	MCP-100	£299	80K	64K	32K Microsoft MSX BASIC	73 key, full stroke	No	Keypad	RF, CV	40×24	2	Yes	1	Centronics	—	DIN	Mono
Sony	HB-75	£299	80K	64K	32K Microsoft MSX BASIC Sony Firmware	75 key, full stroke	No	Keypad	RF, CV, RGB	40×24	2	—	2	Centronics	—	DIN	Mono
Spectra-video	SVI-728	£250	80K	64K	32K Microsoft MSX BASIC	90 key, full stroke	Yes	Keys	RF, CV	40×24	2	Yes	1	Centronics	—	DIN	Mono
Toshiba	HX-10	£239	80K	64K	32K Microsoft MSX BASIC	73 key, full stroke	No	Keypad	RF, CV	40×24	2	Yes	1	Centronics	—	DIN	Mono
Yamaha	CX5M	£449	48K	32K	32K Microsoft MSX BASIC	73 key, full stroke	No	Keypad	RF, CV	40×24	2	Yes	1	Centronics	—	DIN	Mono



CanonV-20 £280

Canon are perhaps better known for their cameras and copiers. This is their only MSX micro and it conforms to standard 64K specifications. The attention-grabbing feature is the extra large cursor keypad that is excellent for games playing. There are two joystick ports too, and the price is a little lower than the top range MSX rivals.

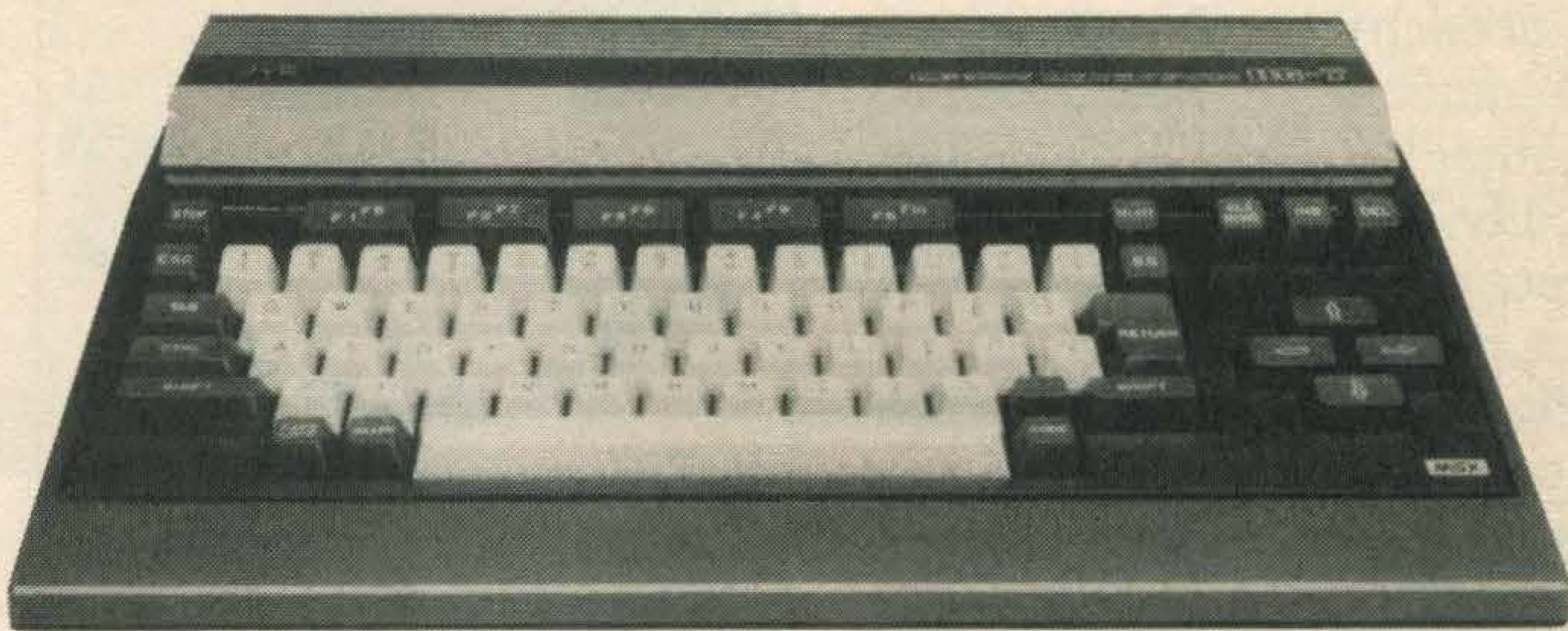
Canon's peripherals are limited to a joystick, though they do make non-MSX printers. They are keeping a low profile in the market, with machines available mainly through Comet and Spectrum shops. The V-20 has few distinctive features, but does all a 64K MSX micro should.

JVCHC-7 £279

JVC are big in the audio and video fields. In the computer field, they are playing things cool. The HC-7 is a standard 64K MSX machine, blessed with excellent styling and quality throughout.

There are no special features, though JVC do have plans for an interface with video disc. They currently have a joystick and a number of data recorders available. It is a case of watch this space for other peripherals.

The JVC has a middling price and if looks mean anything, it is an attractive machine. It offers nothing that other 64K machines don't have, other than style.



SOUND				OTHER				
Built-in speaker	Reset button	Built-in storage	Power supply	Software supplied	Accessories supplied	Distributor	Reviewed	Comments
No	No	No	Built-in	None	M(2), C, RF	Canon (UK) Ltd, Canon House, 2 Manor Rd, Wallington, Surrey SM6 0AJ	Nov '84	Canon's effort isn't a world beater, but it does a more than adequate job
No	No	No	Built-in	Demo, 1 game	M(2), C, RF	Microdealer (UK) Ltd, 29 Burrowfields, Welwyn Garden City, Herts AL7 4SS	Mar '85	The emphasis is on value for money and durability
No	Yes	No	Built-in	1 utility, 1 game	M, C, RF	JVC, JVC House, 12 Priestley Way, Eldon Wall Trading Estate, Staples Corner, London NW2	Nov '84	JVC offer style and support plus a 'branded' expansion into music and video accessories
No	No	No	Built-in	Demo, 6 games	M, C, RF	Mitsubishi Electric (UK) Ltd, Otterspool Way, Watford, Herts WD2 8LD	Mar '85	Plenty going for it and excellent value for money to boot
No	No	No	Built-in	Demo, 6 games	M, C, RF	Mitsubishi Electric (UK) Ltd, Otterspool Way, Watford, Herts WD2 8LD	Nov '84	Those after a reliable, solid MSX computer won't go far wrong
No	No	No	Built-in	None	M, C, T(3)	Panasonic UK Ltd, 300-318 Bath Rd, Slough, Berks SL1 6SB	Mar '85	The style of the Panasonic does make it stand out from the crowd
es	Yes	No	Built-in	None	M(3), RF, CPU keyboard	Pioneer High Fidelity, 116 Field Way, Greenford, Middlesex UB6 8UZ	Sep '85	Pioneer's micro includes the P-BASIC language turning it into a video controller
No	Yes	No	Built-in	Demo, 3 games	M(2), C, RF	Sanyo Marubeni (UK) Ltd, Sanyo House, 8 Greycaine Rd, North Watford, Herts WD2 4UQ	Nov '84	The Sanyo is one of the best MSX machines in terms of quality
No	Yes	No	Built-in	3 utilities (built-in)	M(2), C, RF	Sony (UK) Ltd, Sony House, South St, Staines, Middx TW18 4PF	Nov '84	The Sony HB-75 shows what the MSX standard could be all about
No	No	No	External	None	M, C, RF, Transformer	Spectravideo Ltd, 165 Garth Rd, Morden, Surrey SM4 4LH	Nov '84	It is more a business than a games machine
No	No	No	Built-in	Demo, 3 games	M(2), C, RF	Toshiba Ltd, Toshiba House, Frimley Rd, Frimley, Camberley, Surrey	Nov '84	One of the first and most numerous of the MSX machines
No	No	No	External	Voicing prog	YK-01 keyboard, M, C, RF	Kemble-Yamaha Music (UK) Ltd, Mount Ave, Bletchley, Milton Keynes MK1 1JE	Mar '85	As a synthesizer for the home, it is a super instrument

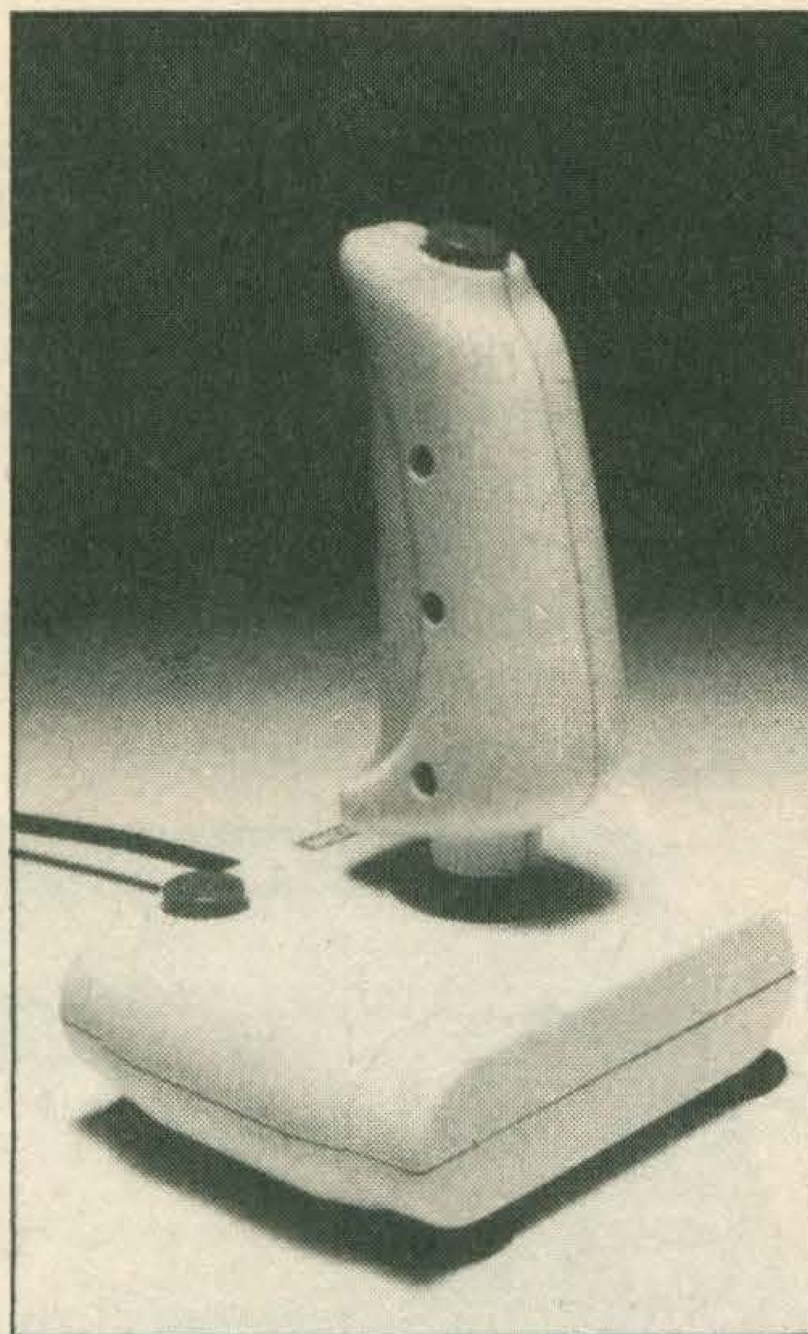
JOYSTICKS

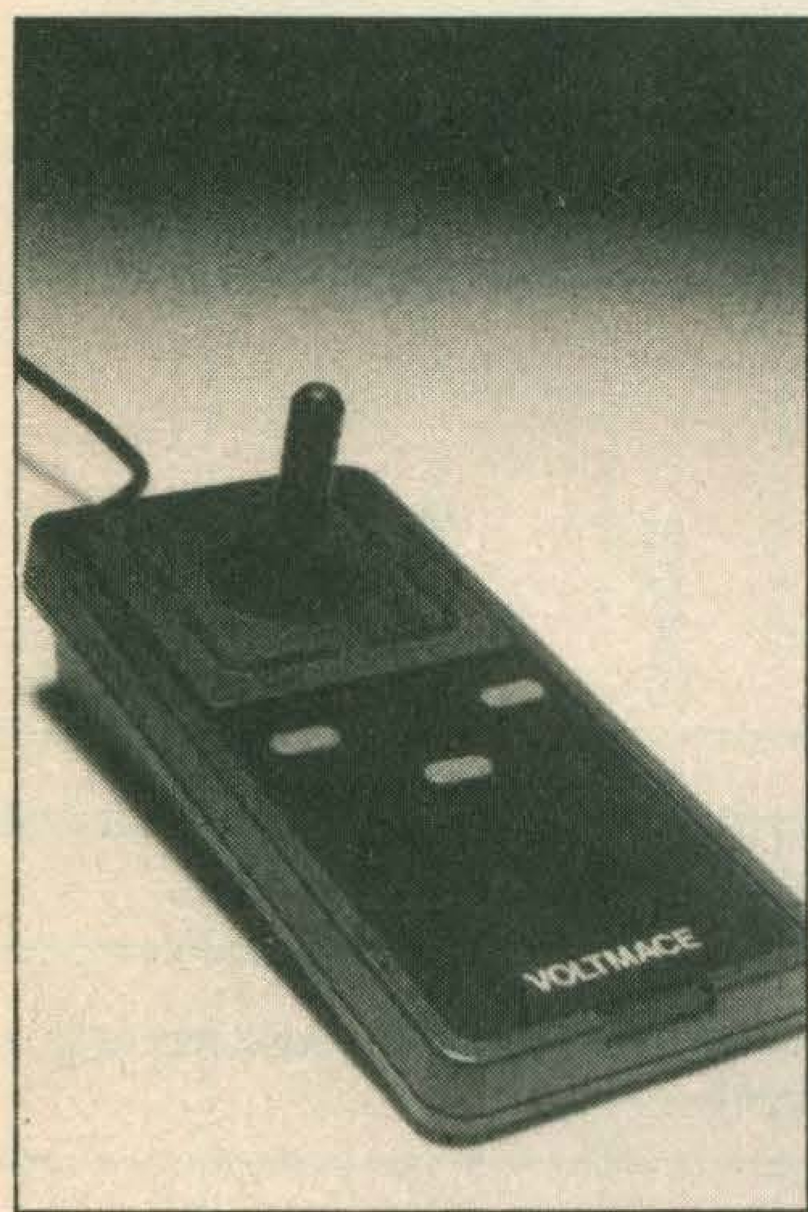
Whether you're attacking mutant hordes or rescuing maidens in distress you'll find a joystick invaluable.

For two player games, a pair is essential. There's a huge choice.

Our guide sets out the important facts about MSX-compatible joysticks and will help you make sense of the variety of models available.

For each joystick we've listed the number of fire buttons, whether it has a fast fire facility, the number of firing directions controls, the type of feet, if any, the cord length, the supplier and of course the price.





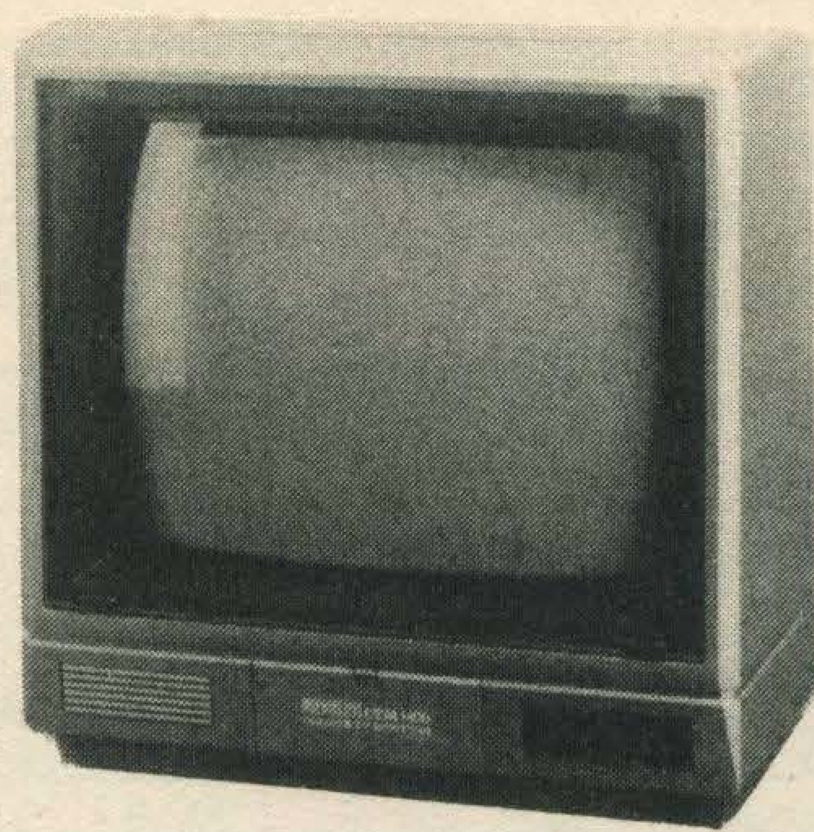


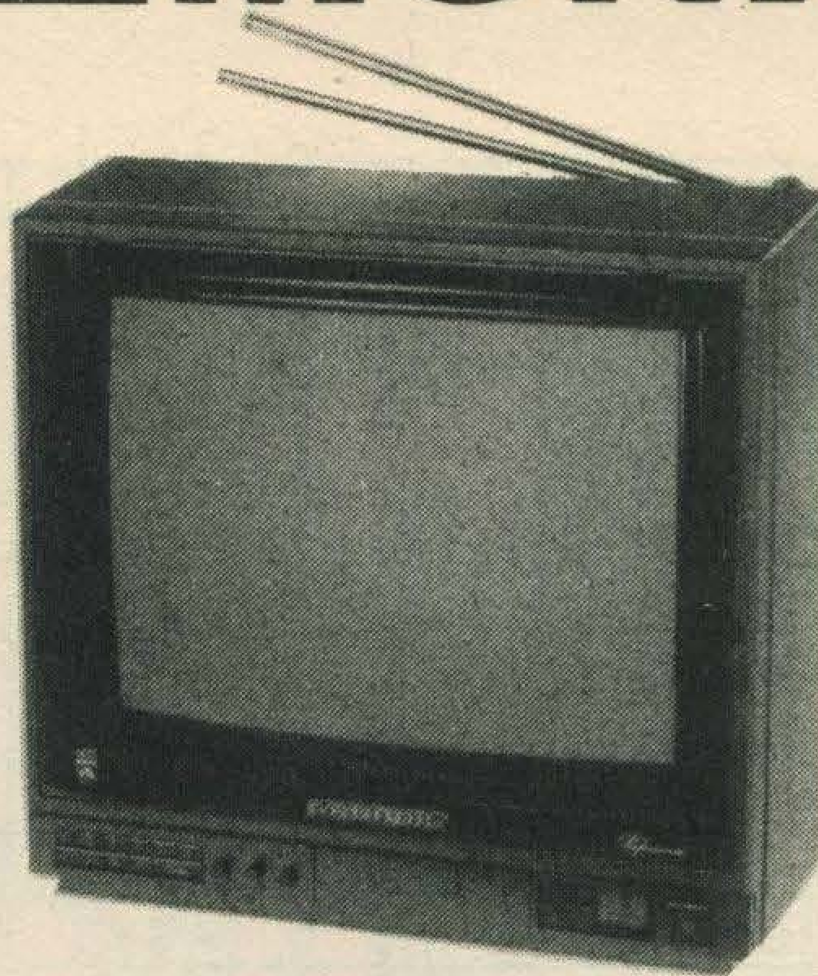
Model	Number of Fire Buttons	Firing Directions	Fast Fire	Feet	Length of Cord	Price	Supplier
Atari CX-40	1	8 way	No	Rubber feet	120cm	£7.99	Atari International (0753) 33344
Atari CX-24 Super-Controller	2	8 way	No	None	100cm	£9.99	Atari International
Atari Trak-Ball CX-80	n/a	Infinite	Yes	Rubber feet	100cm	£19.99	Atari International
Bat Handle	2	8 way	No	Rubber feet	100cm	£27.99	Consumer Games Ltd (CGL) 01-508 5600
The Boss	1	8 way	No	Rubber feet	100cn	£17.95	CGL
Canon VJ200	2	8 way	No	Suction cups	120cm	£10.95	Canon (UK) Ltd 01-7733173
Champion	2	8 way	No	Rubber feet	100cm	£11.99	CGL
Competition Pro 1000	1	8 way	No	Rubber feet	150cm	£8.95	Kempston Micro Electronics (0234) 856633
Computer Command	2	8 way	Yes	Rubber feet	150cm	£27.95	CGL
Formula 1	3	8 way	No	Rubber feet	150cm	£16.95	Kempston Micro Electronics
Formula 2	2	8 way	No	Rubber feet	150cm	£11.95	Kempston Micro Electronics
Hypershot	2	n/a	No	Rubber feet	110cm	£15.20	Konami Ltd 01-429 2446
Joy Card	2	8 way	No	Hand held	120cm	£8.95	Hudson Soft (UK) Ltd 01-458 3310
Junior Pro	1	8 way	No	Rubber feet	150cm	£5.99	Kempston Micro Electronics
JVC HCJ615	2	8 way	No	Suction cups	150cm	£12.95	JVC (UK) Ltd 01-450 3282
The Kraft	1	8 way	No	Hand held	200cm	£13.95	Silica shop 01-309 1111
Kraft Switch Hitter	2	8 way	Yes	Rubber feet	150cm	£14.95	Silica Shop 01-309 1111
Lightning Deluxe	1	8 way	No	Suction cups	120cm	£9.95	Lightning 01-969 5255
Marconi RB2 Tracker-Ball	n/a	n/a	Yes	Rubber feet	100cm	£89.50	Central Trade Exchange (0582) 64334
Microlink Beam Stick	2	8 way	No	Hand held	n/a	TBA	Microlink (0730) 895296
Mitsubishi ML50JY	2	8 way	No	Suction cups	150cm	£15.00	Mitsubishi (UK) Ltd (0923) 770000
Vulcan MSX	2	8 way	No	Suction cups	150cm	£12.95	Vulcan Electronics 01-203 6366
Panasonic CF2201	3	8 way	No	Rubber feet	150cm	£19.95	Panasonic (UK) Ltd (75) 34522
Pioneer PX-JY8	2	8 way	No	Suction cups	250cm	£10.00	Pioneer 01-5755757
Pointmaster	1	8 way	No	Rubber feet	150cm	£14.65	Silica Shop
Pointmaster Pro	1	8 way	Yes	Suction cups	50cm	£14.95	Silica Shop
Quickshot 1	2	8 way	No	Suction cups	120cm	£7.95	Spectravideo Ltd 01-3300101
Quickshot 2	2	8 way	Yes	Suction cups	150cm	£12.95	Spectravideo Ltd
Quickshot 5	3	8 way	Yes	Suction cup	150cm	£9.95	Spectravideo Ltd
Quickshot 7	2	8 way	Yes	Hand held	150cm	£11.95	Spectravideo Ltd
Sanyo NJ002	2	8 way	No	Suction cups	150cm	£12.99	Sanyo Marubeni (0923) 46363
Scoreboard	2	8 way	No	Rubber feet	100cm	£28.95	Kempston Micro Electronics
Sony JS-55	3	8 way	Yes	Hand held	115cm	£22.14	Sony (UK) Ltd (81) 61688
Sony JS-75	3	8 way	Yes	Hand held	Remote control	£73.80	Sony (UK) Ltd
Sumlock Pro-Ace Competition	2	8 way	No	Rubber feet	150cm	£10.95	Sumlock Electronics 061-834 4233
Super Champ	2	12 way	No	Suction cups	300cm	£9.95	Dean Electronics (0344) 885661
TG Enjoystick	2	8 way	Yes	Suction cups	100cm	£34.95	Silica Shop
Toshiba HX-J400	2	Infinite	No	Rubber feet	150cm	£12.99	Toshiba (UK) Ltd (0276) 62222
Tracker Ball RB2	2	Infinite	Yes	Rubber feet	100cm	£59.50	Central Trading Exchange (0582) 64334
Voltmace Delta 3SM	3	Infinite	Yes	Hand held	130cm	£12.00	Voltmace Ltd (0462) 894410
Wico 3 way Deluxe (3 handles)	2	8 way	No	Sticky feet	150cm	£22.95	CGL
Wico Red Ball	2	8 way	Yes	Rubber feet	150cm	£19.95	CGL
Wico Trak-Ball	2	Infinite	No	Rubber feet	150cm	£34.95	CGL

Colour monitors have been designed specifically to display computer generated characters and graphics clearly and efficiently. Eye strain is also reduced.

Resolution refers to the number of pixels (computer defined dots) on the monitor display surface. High and medium resolutions contain higher pixel densities then the standard so can show more detailed images.

Cathode Ray Tubes (CRT) generate the monitor's visual display and the size, usually measured in inches refers to the picture diagonal.





Display depends on the monitor resolution. High and medium resolutions can display 80 characters across 25 lines. Standard displays 40 characters across 25 lines.

There are two main ways of sending a monitor signal. With RGB [red, green and blue] the three colours are sent as separate signals. Only the Sony and JVC will accept RGB monitors. PAL or Composite Video signals are sent with the three colours already synchronised.

Some monitors have the facility to switch to a green monochrome screen which is useful for applications such as word processing.

Model	Resolution	C.R.T.	Display	Input	Green Screen Option	Built in Speaker	Brightness Contrast	Horizontal Vertical	Case Colour	Supplier	Price
Commodore 1701	Medium	14in	40×25	PAL	No	Yes	Yes	No	Cream	Commodore (0536) 205555	£230
Cub 1431 AP/MS	Standard	14in	40×25	RGB/PAL	No	Yes	Yes	Yes	Beige	Microvitec (0274) 390011	£259
Cub 1431 AP/DS	Standard	14in	40×25	RGB/PAL	No	Yes	Yes	Yes	Beige	Microvitec	£259
Cub 1451 AP/MS	Medium	14in	80×25	RGB/PAL	No	Yes	Yes	Yes	Beige	Microvitec	£344
Cub 1451 AP/DS	Medium	14in	80×25	RGB/PAL	No	Yes	Yes	Yes	Beige	Microvitec	£344
Cub 2030/CS	Standard	20in	80×25	RGB/PAL	No	Yes	Yes	Yes	Beige	Microvitec	£443
Ferguson MC01	Standard	14in	40×25	RGB	No	Yes	Yes	Yes	Dark Grey	Ferguson 01-807 3060	£230
Fidelity CM14	Standard	14in	40×25	RGB/PAL	No	Yes	Yes	Yes	Grey	Fidelity 01-965 8771	£200
Fidelity CTM1400	Standard	14in	40×25	RGB/PAL	No	Yes	Yes	Yes	Grey	Fidelity	£220
Fidelity CTV20T	Standard	20in	40×25	RGB/PAL	No	Yes	Yes	Yes	Teak	Fidelity	£300
Fidelity CTV22T	Standard	22in	40×25	RGB/PAL	No	Yes	Yes	Yes	Teak	Fidelity	£340
Grundig P40125	Medium	35.6cm	80×25	RGB/PAL	No	Yes	Yes	Yes	Silver	Grundig 01-659 2468	£220
Grundig P40145	Medium	35.6cm	80×25	RGB/PAL	No	Yes	Yes	Yes	Silver	Grundig	£260
Grundig P55145	Medium	50.8cm	80×25	RGB	No	Yes	Yes	Yes	Silver	Grundig	£360
Grundig C2402	Standard	14in	40×25	RGB	No	Yes	Yes	No	Silver	Newark Video Centre (0636) 71475	£287
Grundig C3104	Standard	16in	40×25	RGB	No	Yes	Yes	No	Silver	Newark	£300
Grundig C3404	Standard	16in	40×25	RGB/PAL	No	Yes	Yes	No	Silver	Newark	£344
Grundig C60100	Standard	20in	40×25	RGB	No	Yes	Yes	No	Silver	Newark	£340
Grundig C64100	Standard	20in	40×25	RGB/PAL	No	Yes	Yes	No	Silver	Newark	£378
Grundig C70100	Standard	22in	40×25	RGB	No	Yes	Yes	No	Silver	Newark	£378
Grundig C74100	Standard	22in	40×25	RGB/PAL	No	Yes	Yes	No	Silver	Newark	£418
Grundig C84100	Standard	26in	40×25	RGB/PAL	No	Yes	Yes	No	Silver	Newark	£546
Hantarex CT900/3	Standard	14in	40×25	RGB/PAL	No	Yes	Yes	Yes	White	Hantarex 01-778 1414	£297
Hantarex CT900/D1	Standard	14in	40×25	RGB/PAL	No	Yes	Yes	Yes	White	Hantarex	£297
Hantarex CT900/D	Medium	14in	80×25	RGB	No	Yes	Yes	Yes	White	Hantarex	£435
Hantarex CT900/D1	Standard	26in	40×25	RGB/PAL	No	Yes	Yes	Yes	White	Hantarex	£483
ITT RL 2315	Standard	14in	40×25	RGB/PAL	No	Yes	Yes	No	Grey	ITT Consumer Products (0268) 3040	£223
ITT RL 2310/M	Standard	14in	40×25	RGB/PAL	No	Yes	Yes	No	Grey	ITT	£259
ITT CT 2600	Medium	22in	80×25	RGB/PAL	No	Yes	Yes	No	Teak	ITT	£344
ITT CT 2700/M	Medium	26in	80×25	RGB/PAL	No	Yes	Yes	No	Teak	ITT	£414
Kaga Vision Ex	Standard	12in	40×25	RGB/PAL	No	Yes	Yes	Yes	Cream	Data Efficiency (0442) 60155	£248
Kaga Vision II	Medium	12in	80×25	RGB	No	No	Yes	Yes	Cream	Data Efficiency	£328
Kaga Vision III	High	12in	80×25	RGB	No	No	Yes	Yes	Cream	Data Efficiency	£459
Luxor HR14	High	14in	80×25	RGB	No	No	Yes	No	Cream	Emco Electronics 01-737 0971	£516
Normende 1534	Standard	14in	40×25	PAL	No	Yes	Yes	Yes	Platinum, Black, Grey	Nordmende (0296) 20501	£229
Nordmende 3510	Standard	10in	40×25	PAL	No	Yes	Yes	Yes	Platinum, Black, Grey	Nordmende	£299
Nordmende 3534	Standard	14in	40×25	PAL	No	Yes	Yes	Yes	Red, Grey	Nordmende	£249
Nordmende 3636	Standard	16in	40×25	PAL	No	Yes	Yes	Yes	Grey	Nordmende	£299
Nordmende 3630	Standard	20in	40×25	PAL	No	Yes	Yes	Yes	Platinum, Black, Grey	Nordmende	£299
Nordmende 3532	Standard	22in	40×25	PAL	No	Yes	Yes	Yes	Walnut, Platinum, Black, Grey	Nordmende	£359
Nordmende 5102	Standard	22in	40×25	PAL	No	Yes	Yes	Yes	Walnut Grey	Nordmende	£449
Philips CT 2007	Medium	14in	80×25	RGB/PAL	No	Yes	Yes	No	Cream	Philips 01-689 2166	£263
Phoenix FTC-1203	High	12in	80×25	RGB	No	No	Yes	Yes	Cream	Emco Electronics	£459
Portatel	Standard	20in	40×25	RGB/PAL	No	Yes	Yes	Yes	Silver	Portatel (76) 88972	£322
Portatel Luxor	Standard	16in	40×25	RGB/PAL	No	Yes	Yes	Yes	Silver	Portatel	£344
Portatel 5634	Standard	22in	40×25	RGB/PAL	No	Yes	Yes	Yes	Silver	Portatel	£357
Portatel	Standard	26in	40×25	RGB/PAL	No	Yes	Yes	No	Silver	Portatel	£403
Profeel KX 20PSI	Medium	20in	40×25	RGB/PAL	No	No	Yes	Yes	Silver	Sony (81)61688	£500
Sabre	Medium	14in	80×25	RGB	No	No	Yes	No	White	Cotron Electronics (0203) 21247	£523.25
Sabre-LP	Medium	14in	80×25	RGB	No	No	Yes	No	White	Cotron Electronics	£561.20
Sanyo CD3125	Standard	14in	40×25	RGB	No	No	Yes	Yes	Cream	Sanyo (0923) 46363	£228.85
Sanyo CD3195	Standard	14in	40×25	RGB/PAL	No	Yes	Yes	Yes	Silver	Sanyo	£309.35
Sanyo CD3117	Medium	14in	80×25	RGB	No	No	Yes	Yes	Cream	Sanyo	£458.85
Sanyo CRT50	Medium	14in	80×25	RGB	No	No	Yes	Yes	Silver	Sanyo	£458.85

KEY

Type: M — Dot matrix printer. The image is printed by the impact of pins from a pin matrix, the particular pins determining the shape of the character. Dot matrix printers are very fast.

D — Daisywheel printer. These printers work rather like electronic typewriters, using a daisywheel of formed characters. Quality is high, but speeds are slower and you are limited to the characters on the daisywheel.

T — Thermal printer. The print head is heated, thus transferring ink to paper, using a matrix of needles. These printers run very quietly.

I — Inkjet printer. Squirts of ink are directed at the paper to form the characters. It is all relatively new and pricey.

Matrix size: Applicable only to dot matrix and thermal printers — the number of pins used to form a character. Maximum figures are given, the more, the better the quality.

Maximum speed: The number of characters per second (cps) that can be printed.

Paper width: The maximum width of paper the printer will take in inches.

Paper feed: T — Tractor feed. Continuous paper, perforated at the edges, is used and width is adjustable.

P — Pinfeed. As tractor feed, but paper width is fixed.

F — Friction feed. The sort of feed found on typewriters, for one sheet of paper at a time.

Graphics: B — Block graphics. Prints using set characters provided by the printer.

H — Hi-res graphics. The printer can print anything that appears on the screen, in text or graphics modes.

Interface: C — Centronics. The printer interface found on MSX computers.

R — RS232C. An alternative printer interface that can be added to MSX computers.

Other: D — the printer will print the lower portion of characters that extend below the line (g,j etc.)

M — the printer has a slower printing speed to give near letter quality printing.

B — the printer is battery powered.

C — the printer prints in more than one colour.

K — the printer has a

Model	Type	Matrix Size	Max Speed	Paper Widths	Paper Feed	Graphics	Interface	Other	Price	Supplier
ACT Writer 11	M	9 x 9	100cps	10	T,F	H	C	D	£327	ACT
ACT Writer 12	M	9x 7	163cps	—	T,F	H	C	D	£799	ACT
ACT Writer 12S	M	9 x 7	180cps	15	T,F	H	C	D	£799	ACT
ACT Writer 12FC	D	NA	180cps	15	T,F	H	C	D,C	£914	ACT
Brother HR5	M	9 x 9	30cps	8	F	H	C,R	B,D	£236	Brother
Brother EP44	M	24 x 18	16cps	8	F	—	R	K,B	£261	Brother
Brother HR15	D	—	13cps	13.5	F	—	C,R	D,C	£512	Brother
Brother HR25	D	NA	25cps	16.5	T,F	—	C,R	D,C	£863	Brother
Brother HR35	D	NA	35cps	16.5	T,F	—	C,R	D,C	£1,064	Brother
Canon T-22A	T	5 x 7	56cps	10	F	H	C	D	£160	Canon
Canon PW1080A	M	11 x 9	160cps	10	T,F	H	C	D	£401	Canon
Canon PW1156A	M	11 x 9	160cps	17	T,F	H	C	D	£516	Canon
Canon PJ1080A	I	7 x 9	37cps	8.5	F	H	C	C	£574	Canon
Centronics GLP 30101-6	M	9 x 9	50cps	8	T,F	H	C	D	£234	Centronics
Centronics Horizon 80	M	11 x 9	160cps	12	T,F	H	C	D,M	£392	Centronics
Centronics Horizon 156	M	11 x 9	160cps	16.5	T,F	H	C	D,M	£572	Centronics
Centronics Prinstation Q40	M	7 x 8	160cps	10	T	M	C,R	D	£1,178	Centronics
Citizen 560P	M	7 x 5	65cps	3½	F	B	C,R	C	£126	Datac Ltd
Citizen 510	M	5 x 7	45cps	3	F	B	C,R	—	£217	Datac
C. Itoh 7500	M	9 x 9	105cps	11	T,F	B	C	—	£373	C. Itoh
C. Itoh 8510S	M	9 x 9	180cps	11	T,F	H	C,R	D	£598	C. Itoh
C. Itoh 8510SC	M	9 x 9	180cps	11	T,F	H	C,R	D,C	£633	C. Itoh
C. Itoh 1550S	M	9 x 9	180cps	15	T,F	H	C,R	D	£748	C. Itoh
C. Itoh 1550SC	M	9 x 9	180cps	15	T,F	H	C,R	D,C	£863	C. Itoh
Colourjet 132	I	5 x 8	40cps	8	F	H	C	C,D	£654	Integrex
Daisystep 2000	D	NA	20cps	13	F	—	C	—	£334	Micro P.
Dyneer DW16	D	NA	16cps	10	F	H	C	D	£329	X-Data
Dyneer DW20	D	NA	20cps	15	F	H	C,R	D	£535	X-Data
Dyneer DW36	D	NA	36cps	16.5	F	H	C,R	D	£890	X-Data
Epson P-40	T	7 x 9	45cps	4	F	H	C	D,B	£100	Epson
Epson RX-80/T	M	9 x 9	100cps	10	T	H	C	D	£286	Epson
Epson RX-80/FT	M	9 x 9	100cps	10	T,F	H	C	D	£328	Epson
Epson FX-80	M	9 x 9	160cps	10	T	H	C	D	£503	Epson
Epson DX100	D	NA	13cps	11	F	—	C,R	—	£546	Epson
Epson TX-80	M	9 x 9	160cps	10	T	H	C	D	£644	Epson
Epson MX-100	M	9 x 9	100cps	16	T	H	C	D	£546	Epson
Epson FX-100	M	9 x 9	80cps	16	T	H	C	D	£654	Epson
Getex D14	D	NA	13cps	13.5	F	—	C,R	—	£288	Geveke
Getex S11CQ	M	9 x 7	100cps	—	T,F	H	C,R	D	£516	Geveke
Getex S31 CQ	M	9 x 7	100cps	15.5	T,F	H	C,R	D	£460	Geveke
Honeywell L11-1	M	9 x 9	80cps	—	T,F	H	C	D	£401	Geveke
Honeywell S11-CQ	M	16 x 35	100cps	—	T,F	H	R	M,D	£516	Geveke
Honeywell L31CQ	M	11 x 9	150cps	12	T	B	C	D	£776	Geveke
Janome CP1018	M	—	180cps	13	T	B	C	C,D	£892	Thame Systems
Juki 5510	M	9 x 9	180cps	10	T,F	H	C,R	—	£401	Micro P
Juki 6100	D	—	20cps	15.5	F	H	C	—	£458	Micro P
Juki 5520	M	9 x 9	180cps	10	T,F	H	C,R	C	£516	Micro P
Juki 6300	D	—	40cps	15.5	F	H	C	—	£1,034	Micro P
Kaitec KAI180	M	9 x 9	180cps	10	T,F	B,H	C,R	M,D	£401	Hudson
Kaitec KAI1800	M	9 x 9	180cps	16	T,F	B,H	C,R	M,D	£528	Hudson
Mannesman Tally 80	M	9 x 7	80cps	10	T,F	B	C,R	D	£250	Mannesman Tally
Mannesman Tally 160	M	9 x 7	160cps	10	T,F	B	C,R	D	£631	Mannesman Tally
Micro P CPA80	M	8 x 9	100cps	10	T,F	B	C	D,M	£229	Micro P
Micro P 165	M	9 x 9	165cps	10	T,F	H	C	D,M	£309	Micro P
Mitsui 2200	M	9 x 9	180cps	10	F	H	C	D	£516	Thame
Mitsui 4200	M	9 x 9	180cps	15	F	H	C	D	£643	Thame
NEC PC 8023	D	9 x 7	120cps	9	T,P,F	H,G	C	D	£229	NEC
NEC Pinwriter P2	M	7 x 9	180cps	10	T,F	—	C,R	D,M	£747	NEC
OKI Microline 182	M	9 x 9	120cps	10	P,F	B	C	D	£299	X-Data
OKI Microline 192	M	9 x 9	160cps	10	P,F	H	C	D	£399	X-Data
OKI Microline 193	M	9 x 9	160cps	15.5	T,F	H	C	D	£549	X-Data
OKI Microline 84	M	9 x 9	200cps	15.5	T,F	—	C	D,M	£799	X-Data
Olivetti DM5060	M	9 x 7	120cps	—	F	H	C	D	£459	Olivetti

Model	Type	Matrix Size	Max Speed	Paper Widths	Paper Feed	Graphics	Interface	Other	Price	Supplier
Olivetti DM4100	M	9 x 7	120cps	—	T,F	H	C	D	£666	Olivetti
Olympia Compact	D	NA	14cps	13.5	T,F	—	C,R	—	£459	Intelligent
Olympia ESW 102	D	NA	17cps	17	F	—	C,R	—	£650	Intelligent
Panasonic KXP-1091	M	9 x 9	120cps	10	T,F	H	C	D,M	£367	Northamber
Panasonic KXP-1092	M	9 x 9	180cps	10	T,F	H	C	D,M	£505	Northamber
Panther DX109	M	9 x 9	96cps	10	T,F	H	C	D	£229	Datac
Panther II DX120	M	9 x 9	120cps	10	T,F	H	C	D,M	£367	Datac
Paper Tiger 8010	M	36 x 18	180cps	9	T,F	H	C,R	D,M	£539	Data-prod
Paper Tiger 8020	M	36 x 18	180cps	14	T,F	H	C,R	D,M	£642	Data-prod
Qume Letter Pro 20	D	NA	20cps	13	F	—	R,C	—	£604	Qume
Remstar 201	D	NA	13.3cps	13.5	F	—	C,R	K,D	£454	PMS
Seikosha GP-50A	M	5 x 8	40cps	5	F	H	C	—	£100	DRG
Seikosha GP-500A	M	5 x 7	50cps	10	T	—	C,R	—	£180	DRG
Seikosha 100A	M	5 x 7	50cps	10	T	—	C,R	—	£169	DRG
Seikosha GP-550A	M	9 x 8	50cps	10	P,F	H	C	M,D	£230	DRG
Seikosha GP-250X	M	5 x 7	50cps	10	P,F	H	C,R	D	£270	DRG
Seikosha 700A	M	5 x 8	50cps	10	P,F	H	C,R	C	£350	DRG
Shinwa CPA80	M	13 x 9	100cps	10	T,F	B	C	D	£229	Micro P
Silver Reed EXP400	D	NA	12cps	12	F	—	C,R	D	£288	Silver Reed
Silver Reed EXP500	D	NA	16cps	13	F	—	C,R	D	£615	Silver Reed
Silver Reed EXP550	D	NA	19cps	17	F	—	C,R	D	£654	Silver Reed
Smith Corona Fastext 80	M	9 x 8	80cps	11	T,F	H	C	D	£195	Smith Corona
Smith Corona TP1	D	NA	11cps	13	F	—	R	D	£250	Smith Corona
Smith Corona L1000	D	NA	12cps	13	F	—	C,R	D	£265	Smith Corona
Smith Corona D200	M	17 x 18	160cps	11	T,F	H	C,R	M,D	£397	Smith Corona
Smith Corona D300	M	17 x 18	160cps	15	T,F	H	C,R	M,D	£596	Smith Corona
Samleco DT-80	M	11 x 9	30cps	8.5	F	H	C	D	£115	Samleco
Samleco DX-85	M	9 x 9	120cps	10	P,F	H	C	D	£220	Samleco
Samleco DX-135	M	9 x 9	120cps	15	T,F	H	C	D	£332	Samleco
Samleco DX-86	M	9 x 9	120cps	10	P,F	H	C	D	£343	Samleco
Samleco DY-40	D	—	40cps	15	T	—	C,R	—	£895	Samleco
Sanple Daisy Junior	D	—	136cps	10	P,F	—	C,R	—	£252	Hudson
Shinwa JP-808	M	7 x 8	80cps	10	F,T	B	C,R	D	£206	Hudson
Shinwa JP-100A	M	7 x 8	100cps	10	F,T	B	C,R	D	£229	Hudson
Shinwa JP-130A	M	9 x 9	130cps	10	F,T	B	C,R	D	£263	Hudson
Shinwa LP-1510	M	9 x 9	130cps	16	F,T	B	C,R	D	£378	Hudson
Star STX-80	T	9 x 10	60cps	10	F	B	C	D	£182	Star
Star SG10	M	9 x 9	120cps	10	F	B,H	C	D	£297	Star
Star FG15	M	9 x 9	120cps	15	F	B	C	D	£447	Star
Star Power type	D	NA	18cps	10	F	—	C	D	£436	Star
Star FD10	M	9 x 11	160cps	10	T,F	B	C,R	D	£447	Star
Star FT15	M	9 x 11	160cps	15	T,F	B	C,R	D	£562	Star
Star FR10	M	9 x 11	200cps	10	T,F	B	C,R	M,D	£562	Star
Star FR15	M	9 x 11	200cps	15	T,F	B	C,R	M,D	£677	Star
Tandy CGP115	I	—	12cps	4.5	P	—	C	C	£150	Tandy
Tandy DMP120	M	9 x 9	120cps	10	T,F	B	C	—	£399	Tandy
Tandy DMP420	M	9 x 9	140cps	14.5	T,F	B,M	C,R	D	£499	Tandy
Taxan KP-810	M	9 x 9	140cps	10	T,F	H	C,R	D	£389	Data E
Taxan KP-910	M	9 x 9	140cps	17	T,F	H	C	D	£493	Data E
Tensho TMP100	T	16 x 16	50cps	10	F	H	C,R	D	£252	Hudson
Texas 850	M	9 x 7	150cps	10	T,F	H	C,R	D,M	£799	Texas Instruments
Toptronic 15	D	NA	13cps	13.5	F	H	C,R	—	£375	PMS
Toptronic 15	D	—	13.3	13.5	F	—	C,R	K,D	£431	PMS
Toshiba HX-P570	Pens	NA	–cps	12	F	H	C	C,D,G	£250	Toshiba
Toshiba HX-P550	M	—	105cps	16	F	H	C	D,G	£350	Toshiba
Triumph Adler TRD 7020	D	NA	20cps	14	F	—	C,R	D	£431	Triumph Adler
Triumph Adler DRH 80/1	M	7 x 9	80cps	12	T,F	H	C,R	D	£520	Triumph Adler
Triumph Adler DRH 136	M	7 x 9	120cps	—	T,F	H	C,R	D,M	£621	Triumph Adler
Turbo 20	D	NA	20cps	15	F	—	C	—	£344	OEM
VRX80	M	7 x 9	100cps	9.5	T,F	H	C,R	D	£454	Integrex

keyboard, so can be used as a typewriter.

F — the printer can be used as a viewdata terminal.

G — the printer can print MSX graphics.

ADDRESS

ACT — (021) 503 0666

Brother Office Equipment — 061-330 6531

Canon (UK) Ltd — (0256) 473232

Centronics — 01-581 1011

C. Itoh Electronics Co. Ltd — 01-946 4960

Datac Ltd — 061-941 2361

Data Efficiency — (0442) 60155

Dataproducts (Retail Division) Ltd — (0734) 884777

DRG Business Machines — (0934) 419914

Epson — 01-902 8892

Geveke Electronics — (04867) 88676

Hudson — 01-458 3310

Integrex Ltd — (0283) 215432

Intelligent Interfaces — (0789) 296879

Mannesman Tally Ltd — (0734) 788711

Micro Peripherals — (0256) 473232

NEC — 01-267 7000

Newbury Data — (0784) 61500

Northamber — 01-391 2066

OEM Peripherals — 01-748 8404

Olivetti — 01-785 6666

Panasonic — (75) 73181

PMS Developments — (0432) 265768

Qume (UK) Ltd — (0734) 584646

Samleco — (07535) 54717

Silver Reed (UK) Ltd — (0923) 45976

Smith Corona Data Products — 01-900 1222

Star Micromics — 01-840 1800

Tandy Corp — (0922) 648181

Texas Instruments — (0234) 67466

Thame Systems — (084) 421 6698

Toshiba (UK) Ltd — (0276) 62222

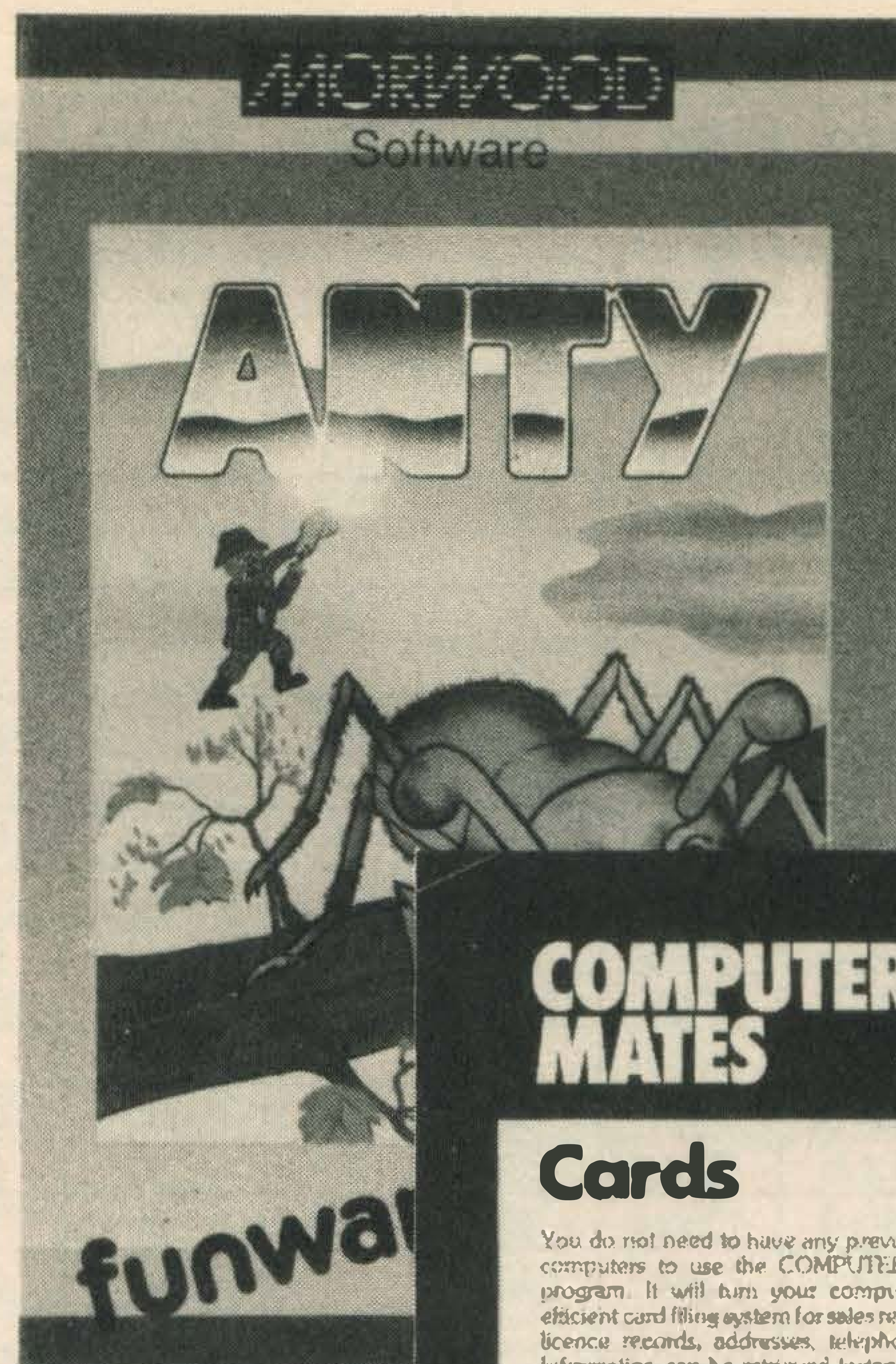
Triumph Adler — 01-253 5608

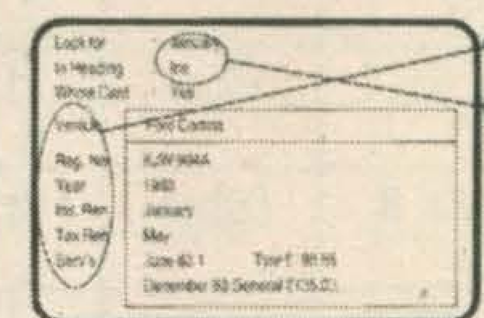
X-Data — (0753) 72331

BUYERS GUIDE

GAMES AND SIMULATORS

Title	Type	Format	Joystick	Price	Supplier
3D Golf	Arcade	Cass	No	£7.95	Toshiba
737 Flight Simulator	Simulator	Cass	Yes	£9.59	Microsoft
Adventure Quest	Adventure	Cass	No	£9.95	Level 9
Alpha Blaster	Arcade	Cass	Yes	£1.99	Silversoft
Antarctic Adventure	Arcade	Cart	Yes	£17.40	Konami
Ant Attack	Arcade	Cass	Yes	£7.95	Quicksilva
Anty	Arcade	Cass	Yes	£6.95	Morwood
Armoured Assault	Arcade	Cass	Yes	£6.95	Spectravideo
Athletic Land	Arcade	Cart	Yes	£17.40	Konami
A View to Kill	Arcade	Cass	Yes	£10.99	Domark
Backgammon	Traditional	Cass	Yes	£9.95	Electric
Barnstormer	Arcade	Cass	Yes	£8.95	Electric
Battle Cross	Arcade	Cart	Yes	£18.00	Sony
Battleship Clapton 2	Arcade	Cass	Yes	£7.95	Toshiba
Beam Rider	Arcade	Cass	Yes	£11.99	Activision
Binary Land	Arcade	Cass	Yes	£8.95	Kuma
Blagger	Arcade	Cass	Yes	£7.95	Alligata
BMX Racers	Arcade	Cass	Yes	£1.99	Mastertronic
Boardello	Traditional	Cass	No	£7.95	Bubble Bus
Boulderdash	Arcade	Cass	Yes	£6.95	Orpheus
Breakout	Arcade	Cart	Yes	£18.80	Panasonic
Bridge	Traditional	Cass	No	£9.95	Alligata
Buck Rodgers	Arcade	Cass	Yes	£11.95	Electric
Bugaboo (The Flea)	Arcade	Cass	Yes	£7.95	Quicksilva
Buzz Off	Arcade	Cass	Yes	£7.95	Electric
Cando Ninja	Arcade	Cart	Yes	£18.80	Panasonic
Cannon Balls	Arcade	Cass	Yes	£5.95	Hudson Soft
Cannon Fighter	Arcade	Cass	Yes	£6.95	Morwood
Castle Combat	Arcade	Cass	Yes	£6.95	Spectravideo
Cave Adventure	Adventure	Cass	No	£5.95	Knights
Chiller	Arcade	Cass	Yes	£1.99	Mastertronic
Chuckie Egg	Arcade	Cass	Yes	£6.90	A & F
Circus Charlie	Arcade	Cart	Yes	£17.40	Konami
Classic Adventure	Adventure	Cass	No	£6.95	Melbourne House
Coco and the Castle	Arcade	Cass	Yes	£6.95	Kuma
Colossal Adventure	Adventure	Cass	No	£9.95	Level 9
Comic Bakery	Arcade	Cart	Yes	£14.95	Konami
Computer Billiards	Traditional	Cart	Yes	£18.00	Sony
Contract Bridge	Traditional	Cass	No	£9.95	Alligata
Crazy Bullet	Arcade	Cart	Yes	£18.80	Panasonic
Crazy Golf	Arcade	Cass	Yes	£7.95	Mr Micro
Cribbage	Traditional	Cass	No	£5.95	Kuma
Cross Force	Arcade	Cass	Yes	£6.95	Spectravideo
Cubit	Strategy	Cass	Yes	£7.95	Mr Micro
Daredevil Denis	Arcade	Cass	Yes	£7.95	Visions
Darkwood Manor	Adventure	Cass	No	£7.95	Kuma
Darts	Traditional	Cass	No	£3.00	Orpheus
Death Valley Gold Rush	Adventure	Cass	No	£7.95	Kuma
Decathlon	Arcade	Cass	Yes	£11.99	Activision
Disc Warrior	Arcade	Cass	Yes	£7.95	Alligata
Dog Fighter	Arcade	Cass	No	£6.95	Kuma
Dorodon	Arcade	Cart	Yes	£18.00	Sony
Driller Tanks	Arcade	Cass	No	£8.95	Kuma
Dungeon Adventure	Adventure	Cass	No	£9.95	Level 9
Emerald Isle	Adventure	Cass	No	£6.95	Level 9
Eric & The Floaters	Arcade	Cass	Yes	£5.95	Kuma
Exchanger	Arcade	Cass	Yes	£18.80	Panasonic
Exploding Atoms	Strategy	Cass	No	£5.95	Knights
Fairy	Arcade	Cass	Yes	£7.95	Morwood
Finders Keepers	Arcade	Cass	Yes	£1.99	Mastertronic
Fire Rescue	Arcade	Cass	No	£7.95	Kuma
Flightpath 77	Simulator	Cass	Yes	£6.95	Anirog
Flipper Slipper	Arcade	Cass	Yes	£6.95	Spectravideo
Frantic Freddy	Arcade	Cass	Yes	£6.95	Spectravideo
Fred	Arcade	Cass	Yes	£6.95	Quicksilva
Galactic Mercenaries	Adventure	Cass	No	£7.95	Kuma
Galaxia	Arcade	Cass	Yes	£7.95	Kuma





Title	Type	Format	Joystick	Price	Supplier
Games Pack I	Arcade	Cass	Yes	£4.95	Orpheus
Gang Man	Arcade	Cass	Yes	£7.95	Hudson Soft
Ghostbusters	Arcade	Cass	Yes	£11.99	Activision
Golf	Traditional	Cart	Yes	£18.80	Panasonic
Grid Runner	Arcade	Cass	Yes	£5.00	Llamasoft
Grid Trap	Strategy	Cass	Yes	£1.99	Livewire
Gumshoe Logic	Strategy	Cass	No	£9.20	Megacycal
H.E.R.O.	Arcade	Cass	Yes	£11.99	Activision
Hero	Arcade	Cass	Yes	£3.95	Microcom
Highway Star	Arcade	Cart	Yes	£18.80	Panasonic
Holdfast	Strategy	Cass	No	£5.95	Kuma
Hole In One	Traditional	Cart	Yes	£14.95	Morwood
Hot Shoe	Arcade	Cass	Yes	£5.95	Longman
Humphrey	Arcade	Cass	Yes	£7.95	Mr Micro
Hunchback	Arcade	Cass	Yes	£6.90	Ocean
Hunter Killer	Adventure	Cass	No	£7.95	Kuma
Hustler	Traditional	Cass	Yes	£6.99	Bubble Bus
Hyper Olympics	Arcade	Cart	Yes	£14.95	Konami
Hyper Sports 1	Arcade	Cart	Yes	£17.40	Konami
Hyper Sports 2	Arcade	Cart	Yes	£17.40	Konami
Hyper Viper	Arcade	Cass	No	£7.95	Kuma
Icicle	Arcade	Cass	Yes	£7.95	Statesoft
I.G.I.	Arcade	Cass	Yes	£3.95	Microcom
Illegus	Arcade	Cart	Yes	£18.80	Panasonic
Jet Set Willy	Arcade	Cass	Yes	£7.95	Software Proj
Juno First	Arcade	Cart	Yes	£18.00	Sony
King's Valley	Arcade	Cart	Yes	£17.40	Konami
Konami's Golf	Simulation	Cart	Yes	£17.40	Konami
Kubus	Arcade	Cass	Yes	£6.95	Kuma
Lazy Jones	Arcade	Cass	Yes	£8.95	Terminal
Le Mans	Arcade	Cass	No	£9.95	Electric
Les Flics	Arcade	Cass	Yes	£7.95	PSS
Lords Of Time	Adventure	Cass	No	£9.95	Level 9
Knight Othello	Strategy	Cass	No	£5.95	Knights
Magic Carpet	Arcade	Cass	Yes	£1.99	Mastertronic
Manic Miner	Arcade	Cass	Yes	£7.95	Software Proj
Marine Battle	Arcade	Cart	Yes	£18.80	Panasonic
Mayhem	Arcade	Cass	Yes	£7.95	Mr. Micro



Title	Type	Format	Joystick	Price	Supplier
Master of	Arcade				
the lamps	Arcade	Cass	Yes	£11.99	Activision
Maxima	Adventure	Cass	Yes	£7.95	PSS
Mean Streets	Arcade	Cass	No	£6.95	Kuma
Midnight Building	Arcade	Cart	Yes	£18.80	Panasonic
Midway	Arcade	Cart	Yes	£18.80	Panasonic
Mind Control	Arcade	Cass	Yes	£1.99	Mastertronic
Minder	Arcade	Cass	Yes	£9.95	DKTronics
Mopiranger	Arcade	Cart	Yes	£14.95	Konami
Mr Ching	Arcade	Cart	Yes	£14.95	Morwood
Mr Wong's Laundry	Traditional	Cass	Yes	£6.95	Artic
MSX 21	Traditional	Cart	No	£18.80	Panasonic
MSX Darts	Arcade	Cass	Yes	£4.95	Orpheus
Ninja	Arcade	Cass	Yes	£6.95	Kuma
Nodes of Yesod	Arcade	Cass	Yes	£9.95	Odin
Norseman	Traditional	Cass	Yes	£8.95	Electric
Noughts & Crosses	Arcade	Cass	Yes	£6.95	Spectravideo
Nug-It	Arcade	Cass	Yes	£3.95	Microcom
Nuts and Milk	Arcade	Cass	Yes	£7.95	Hudson Soft

Title	Type	Format	Joystick	Price	Supplier
Oh Mummy!	Traditonal	Cass	Yes	£5.95	Longman
Othello	Arcade	Cass	No	£5.95	Knights
Out Space	Arcade	Cass	Yes	£6.95	Mirage
Packie	Arcade	Cass	Yes	£18.80	Panasonic
Pairs	Arcade	Cart	Yes	£18.80	Panasonic
Panic Junction	Strategy	Cass	Yes	£6.95	Morwood
Panzer Attack	Traditional	Cass	No	£7.95	Lothlorien
Patience	Arcade	Cass	Yes	£6.95	Morwood
Pinball	Arcade	Cass	No	£7.95	Toshiba
Pineapplin	Arcade	Cass	Yes	£7.95	Morwood
Pineapplin	Arcade	Cart	Yes	£18.80	Panasonic
Pinkie	Arcade	Cass	Yes	£8.95	Electric
Pitfall II	Arcade	Cass	Yes	£11.99	Activision
Polar Star	Arcade	Cass	Yes	£7.95	Toshiba
Pretty Sheep	Arcade	Cass	Yes	£7.95	Level 9
Punchy	Arcade	Cass	Yes	£7.95	Mr Micro
Puzzle Brick	Arcade	Cass	Yes	£6.95	Spectravideo
Pyramid Warp	Adventure	Cass	Yes	£7.95	Toshiba
Red Moon	Adventure	Cass	No	£6.95	Level 9
Return To Eden	Arcade	Cass	No	£9.95	Level 9
River Raid	Arcade	Cass	Yes	£11.99	Activision
Roger Rubbish	Arcade	Cass	Yes	£6.95	Spectravideo
Rollerball	Arcade	Cart	Yes	£14.95	Morwood
S.A.S.A.	Arcade	Cart	Yes	£18.80	Panasonic
Sea Hunter	Arcade	Cass	Yes	£6.95	Spectravideo
Sector Alpha		Cass	Yes	£6.95	Spectravideo
Shadow Of	Adventure				
The Bear	Arcade	Cass	No	£7.95	Kuma
Shark Hunter	Arcade	Cass	Yes	£8.95	Electric
Shnax	Arcade	Cass	Yes	£6.95	Kuma
Skramble	Arcade	Cass	Yes	£1.99	Livewire
Sky Jaguar	Arcade	Cart	Yes	£17.40	Konami
Smash	Arcade	Cass	Yes	£6.95	Spectravideo
Smash Out	Traditional	Cass	Yes	£5.95	Knights
Snooker	Adventure	Cass	Yes	£8.95	Visions
Snowball	Arcade	Cass	No	£9.95	Level 9
Sorcery	Simulation	Cass	Yes	£8.95	Virgin
Space Shuttle	Arcade	Cass	Yes	£11.99	Activision
Space Trouble	Arcade	Cart	Yes	£18.80	Panasonic
Space Walk	Arcade	Cass	Yes	£1.99	Mastertronic
Sparkie		Cart	Yes	£18.00	Sony
Special	Adventure				
Operations	Arcade	Cass	No	£7.95	MC Lothlorien
Spectron		Cass	Yes	£6.95	Spectravideo
Spooks &	Arcade				
Ladders	Simulation	Cass	No	£6.95	Kuma
Squash	Arcade	Cass	Yes	£6.95	Spectravideo
Squish 'em	Arcade	Cart	Yes	£18.80	Panasonic
Star Avenger		Cass	Yes	£8.95	Kuma
Starship	Arcade				
Simulator	Arcade	Cart	Yes	£18.80	Panasonic
Step Up	Arcade	Cart	Yes	£14.95	Morwood
Stop The Express	Arcade	Cass	Yes	£6.95	Kuma
Sub Shoot	Traditional	Cass	Yes	£7.95	Hudson Soft
Super Billiards	Traditional	Cart	Yes	£14.95	Morwood
Superchess	Arcade	Cass	No	£8.95	Kuma
Super Cobra	Strategy	Cart	Yes	£14.95	Konami
Supermaze	Strategy	Cass	Yes	£6.95	Morwood
Supermind	Strategy	Cass	Yes	£6.95	Morwood
Superpuzzle	Arcade	Cass	Yes	£6.95	Morwood
Super Snake	Arcade	Cart	Yes	£14.95	Morwood
Swamp	Arcade	Cass	Yes	£3.95	Microcom
Tawara	Arcade	Cart	Yes	£18.80	Panasonic
Tele Bunnie	Simulation	Cart	Yes	£18.80	Panasonic
Tennis	Simulation	Cass	Yes	£6.95	Spectravideo
Tennis	Adventure	Cart	Yes	£17.40	Konami
The Hobbit	Adventure	Cass	No	£14.95	Melbourne Hse
The Red Moon	Arcade	Cass	No	£6.95	Level 9
The Snowman		Cass	No	£7.95	Quicksilva
The Worm in	Adventure				
Paradise	Arcade	Cass	No	£9.95	Level 9
The Wreck	Arcade	Cass	Yes	£9.95	Electric
Time Bandits	Arcade	Cass	Yes	£7.95	PSS
Track & Field 1	Arcade	Cart	Yes	£17.40	Konami
Track & Field 2	Arcade	Cart	Yes	£17.40	Konami
Turboat	Arcade	Cart	Yes	£18.80	Panasonic
Turmoil	Arcade	Cart	Yes	£18.80	Panasonic
Vicious Viper	Arcade	Cass	Yes	£5.95	Knights
Waffle	Arcade	Cass	Yes	£3.95	Microcom

Title	Type	Format	Joystick	Price	Supplier
Weedy	Arcade	Cass	Yes	£3.95	Microcom
Yie-Ar Kung Fu	Arcade	Cart	Yes	£17.40	Konami
Zakil Wood	Adventure	Cass	No	£7.95	Mr Micro
Zaxxon	Arcade	Cass	Yes	£11.95	Electric
Zenji	Arcade	Cass	Yes	£11.99	Activision
Zipper	Arcade	Cass	Yes	£3.95	Kuma

EDUCATIONAL

Title	Type	Format	Joystick	Price	Supplier
3D Hypermath	Maths	Cass	Yes	£7.95	Longman
Adder Sums	Maths	Cass	No	£14.95	Ampalsoft
BMX Number Jump	Maths	Cass	Yes	£7.95	Longman
Calculation 1	Maths	3 Cass	No	£9.95	Morwood
Calculation 2	Maths	3 Cass	No	£9.95	Morwood
Challenge My Bluff	General	2 Cass	No	£9.95	Soft Cat
First Steps	General	Cass	Yes	£8.95	Mirrorsoft
French Is Fun	Language	Cass	No	£7.95	CDS
Fun Sums	Maths	Cass	No	£14.95	Ampalsoft
Fun With Words	Reading	Cass	No	£14.95	Ampalsoft
Funwords	Spelling	Cass	No	£9.95	Soft Cat
German Is Fun	Language	Cass	No	£7.95	CDS
Gods Of The Tomb	General	Cass	No	£9.20	Megacycal
Here & There	General	Cass	No	£7.95	Mirrorsoft
Introducing Circle 1	Maths	Cass	No	£7.95	Spectravideo
Introducing Circle 2	Maths	Cass	No	£7.95	Spectravideo
Intro Percentages	Maths	Cass	No	£7.95	Spectravideo
Intro To BASIC	BASIC	Cass	No	£6.95	Spectravideo
Intro To Numbers	Maths	3 Cass	No	£9.95	Morwood
Italian Is Fun	Language	Cass	No	£7.95	CDS
Junior Maths	Maths	Cass	No	£5.95	Knights
Kriss Kross Quiz	General	2 Cass	No	£9.95	Soft Cat
Large & Small Numbers	Maths	Cass	No	£7.95	Morwood
Let's Go MSX	BASIC	2 Cass	No	£9.95	Soft Cat
Mastermind	General	Cass	No	£9.99	Mirrorsoft
Mastermind Quiz	General	Cass	No	£5.99	Mirrorsoft
Math Bug	Maths	Cass	Yes	£6.95	Spectravideo
Maths Invader	Maths	Cass	Yes	£7.95	Stell Software
Memory	Training	3 Cass	No	£9.95	Morwood
Monkey Academy	Maths	Cart	Yes	£17.40	Konami
MSX BASIC Tutorial	BASIC	Cass	No	£16.95	Knights
MUE	General	Cart	No	£24.95	HAL/Morwood
Number Painter	Maths	Cass	Yes	£8.95	ASK
O'Level Maths	Maths	Cass	No	£9.95	Shield
O'Level Chemistry	Chemistry	Cass	No	£9.95	Shield
O'Level Physics	Physics	Cass	No	£9.95	Shield
Quiz Safari	General	Cass	No	£9.20	Megacycal
Reasoning	Training	3 Cass	No	£9.95	Morwood
Reflexes	Training	3 Cass	No	£9.95	Morwood
Revise Computers	Computing	Cass	No	£8.50	Megacycal
Revise Physics	Physics	Cass	No	£8.50	Megacycal
Simple Addition 1	Maths	Cass	No	£7.95	Spectravideo
Simple Subtraction	Maths	Cass	No	£7.95	Spectravideo
Spanish Is Fun	Language	Cass	No	£7.95	CDS
Star Words	Spelling	Cass	No	£6.95	Spectravideo
Sum Measure	Maths	Cass	No	£14.95	Ampalsoft
Sum Takeaway	Maths	Cass	No	£14.95	Ampalsoft
Sum Times	Maths	Cass	No	£14.95	Ampalsoft
Sum Weights	Maths	Cass	No	£14.95	Ampalsoft
Teach Electricity	Physics	Cass	No	£9.20	Megacycal
The Sphinx Quiz	General	Cass	No	£9.20	Megacycal
Trigonometry	Educational	Cass	No	£7.95	Spectravideo
Typing Tutor	Typing	Cass	No	£5.95	Knights
Uni's Learning	Maths	Cass	No	£6.95	Spectravideo
Word Wobbler	Words	Cass	Yes	£7.95	Longman

BUSINESS

Title	Type	Format	Joystick	Price	Supplier
Aackobase	Database	Cass /disk	No	£39.10	Silversoft
Aackotext	Wordpro	Cass /disk	No	£39.10	Silversoft
Cards	Database	Cart	No	£49.99	Computer Mates
Cash Accounts	Financial	Cart	No	£124.99	Computer Mates
Cash Book	Accounts	Cass	No	£14.95	Micro Aid
Communications	Comm	Cass	No	£19.95	Kuma
Crediquote	Retail	Cart	No	£100.00	Office Junior
Database	Database	Cass	No	£12.95	MST
Database	Database	Cass	No	£19.95	Kuma
Financial Calculator	Financial	Cass	No	£6.95	Spectravideo
Home Accounts	Accounts	Cass	No	£12.95	MST
Home Budget	Accounts	Cass	No	£14.95	Kuma
Homewriter	Wordpro	Cart	No	£39.95	Sony
Knights Budget A/C	Accounts	Cass	No	£14.95	Knights
Knights Mail List	Addresses	Cass	No	£14.95	Knights
Mail Shot	Cards	Cart	No	£99.99	Computer Mates
Marginator	Accounts	Cass	No	£10.00	Office Junior
Memo-Calc	Database	Cass	No	£14.95	Micro Aid
MST-Calc	Speadsheet	Cass	No	£12.95	MST
MT Base	Database	Cart	No	£49.95	MT Technology
Partsearch	Stock	Cass	No	£100.00	Office Junior
Payroll	Wages	Cart	No	£99.00	Computer Mates
Payroll	Wages	Cass	No	£29.95	Micro Aid
RS 233 Communications	Comm	Cart	—	£229.99	Comp Mates
Spectra Chequebook	Accounts	Cass	No	£6.95	Spectravideo
Shoppastoppa	Retail	Cass	No	£100.00	Office Junior
Spreadsheet	Spreadsheet	Cass	No	£29.95	Kuma
Spreadsheet	Spreadsheet	Cart	No	£49.99	Computer Mates
Stock Control	Stock	Cass	No	£34.95	Kemp
Tasprint	Printing	Cass	No	£9.90	Tasman
Tasword MSX	Wordpro	Cass	No	£13.90	Tasman
WDpro	Wordpro	Cass	No	£29.95	Kuma
Word Processor	Text	Cart	No	£49.99	Computer Mates
VAT Cracker	Financial	Cass	No	£10.00	Office Junior

UTILITIES

Title	Type	Format	Joystick	Price	Supplier
Colour Fantasia	Graphics	Cass	No	£9.95	Kuma
Champ	Assembler	Cass	No	£12.95	PSS
EDDY II	Graphics	Cart	No	£24.95	HAL/Morwood
Games Creator	Programming	Cass	Yes	£12.95	Mirrorsoft
Games Designer	Programming	Cass	Yes	£9.95	Quicksilva
Go-Sprite	Graphics	Cass	Yes	£9.95	Mirrorsoft
Graphic Designer	Graphics	Cass	No	£14.95	Electric Studio
Hisoft Devpack	Ass/Disass	Cass	No	£19.95	Hisoft
Hisoft Pascal	Pascal	Cass	No	£29.95	Hisoft
Kuma Forth	Forth	Cass	No	£39.95	Kuma
Logo	Logo	Cass	No	£19.95	Kuma
Machine Code	Assembler	Cass	No	£28.75	Knights
MSX Graphics	Graphics	Cass	No	£5.95	Knights
MT Debugger	Programming	Cart	NO	£39.95	MT Technology
Operation Caretaker	Maintenance	Cass	No	£9.95	Global
Picasso	Graphics	Cass	Yes	£9.95	Morwood
Psychedelia	Graphics	Cass	Yes	£6.00	Kuma
Speech Synthesis	Voice	Cart	No	£69.50	Kuma
Sprite Editor	Graphics	Cass	No	£6.95	Electric Studio
Tasprint MSX	Printing	Cass	No	£9.90	Tasman
Zen M/Code System	M/Code	Cass	No	£19.95	Kuma

MISCELLANEOUS

Title	Type	Format	Joystick	Price	Supplier
MSX Demonstrator	Demonstrator	Cass	No	£5.95	Knights
MT Comms	Comm	Cass	No	£79.95	MT Technology
Music Mentor	Musical	Cass	Yes	£6.95	Spectravideo
Odyssey K	Musical	Cass	No	£11.95	Rittor Music
PSG Musiwriter	Musical	Cart	No	£19.95	Rittor Music
Star Seeker	Star Guide	Cass	No	£9.95	Mirrorsoft

Advertisers Index

General advice to readers concerning advertisements

When replying to advertisements in this issue, you should note the following points:

1. Always clarify the exact nature of any guarantee being offered.
2. Never send cash — always a cheque, Postal or Money Order.
3. Insist on a written receipt.
4. Clearly state the equipment you seek, and detail any acceptable alternatives.
5. Request an immediate statement of how and when the goods are to be delivered and whether the delivery will be split.
6. Check by telephone the latest prices and availability of goods you are ordering.
7. Cases of non-supply or wrong supply of goods should initially be taken up directly and as soon as possible with the supplier.
8. Because of fluctuations in prices and discounts, it is advisable to ensure that you reply only to advertisements published in current issues.

Mail Order Protection Scheme (Limited Liability)

If you order goods from mail order advertisers in this magazine and pay by post in advance of delivery, this publication (What MSX?) will consider you for compensation if the advertiser should become insolvent or bankrupt, provided:

1. **You have not received the goods or had your money returned; and**
2. **You write to the publisher of this publication (What MSX?) explaining the position not earlier than 28 days from the day you sent your order and not later than 2 months from that day.**

Please do not wait until the last moment to inform us. When you write, we will tell you how to make your claim and what evidence of payment is required.

We guarantee to meet the claims from readers made in accordance with the above procedure as soon as possible after the advertiser has been declared bankrupt or insolvent up to a limit of £6,500 per annum for any one advertiser so affected and up to £19,500 p.a. in respect of all insolvent advertisers. Claims may be paid for higher amounts, or when the above procedure had not been complied with, at the decision of the publication (What MSX?) but we do not guarantee to do so in view of the need to set some limit to this commitment and to learn quickly of readers' difficulties.

This guarantee covers only advance payments sent in *direct* response to an advertisement in this magazine (not, for example, payments made in response to catalogues etc, received as a result of answering such advertisements). Classified advertisements are excluded.

Note: The sums referred to are annual amounts available for compensation and they will be divided equally amongst all valid claims received.

"I'M A TOSHIBA HX10. I'VE GOT ALL THE BEST BITS FROM EVERY OTHER HOME COMPUTER. AND MORE. I HAVE A 64K MEMORY, LIKE THE COMMODORE 64. A CASSETTE INTERFACE, LIKE THE BBC. TWO JOYSTICK PORTS, LIKE THE COMMODORE 64. A BUILT IN POWER SUPPLY, LIKE THE BBC. 16 USABLE COLOURS, LIKE THE ACORN ELECTRON. OVER 70 FULL STROKE KEYS, LIKE THE BBC. A CARTRIDGE SLOT, LIKE THE COMMODORE 64. A PRINTER INTERFACE, LIKE THE ORIC ATMOS. SOUND OUTPUT THROUGH THE T.V., LIKE THE COMMODORE 64. AN AUDIO/VIDEO OUTPUT CONNECTION, LIKE THE COMMODORE 64. RF BUILT IN LIKE THE BBC. AND: A SEPARATE 16K VIDEO MEMORY, UNLIKE MOST NON-MSX COMPUTERS. 32 SPRITES, MORE THAN MOST NON-MSX COMPUTERS. AND I USE MICROSOFT EXTENDED BASIC, LIKE EVERY OTHER MSX COMPUTER."

TOSHIBA

"WOW. WITH A SPECIFICATION LIST LIKE THAT. NO WONDER YOU'VE GOT A 64K MEMORY."

You'd expect one of the best-selling home computers in Japan to have a specification list as big as its memory.

But the Toshiba HX10 doesn't just limit itself to that.

It was developed along with other Japanese home computers to operate on one language: MSX. You can swap programs, games, cassettes, even peripherals like disk drives, printers, and joysticks: they're all compatible with every other MSX computer.

All of which makes MSX the system of the future.

So if you want a computer that won't be obsolete in a few years, buy an MSX. If you want one of the best-selling MSX computers in Japan, buy a Toshiba HX10.

TOSHIBA MSX